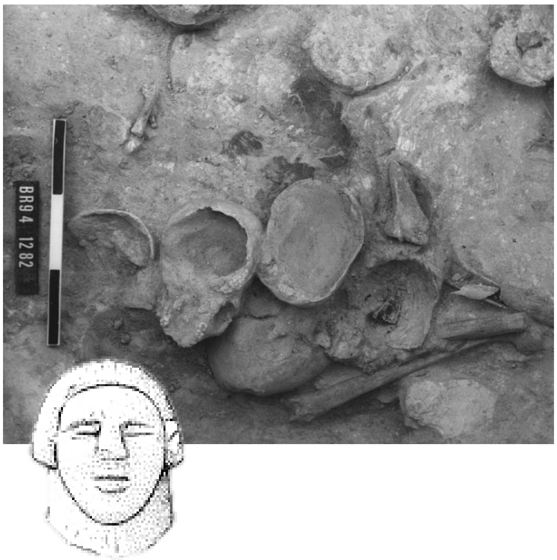
Heads, shoulders, knees and toes:
exploring bodies, body parts and personhood in late Neolithic Malta through funerary taphonomy



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Cover image compiled by author. Photographs of cranial cluster in context (1282) and articulated lower leg and foot in context (1257) from Brochtorff Xagħra Circle (BRX) project archive. Stone figurine fragments in foreground excavated from the Xagħra Circle hypogeum, images from Malone, Bonanno *et al.* 2009, 310.

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Preface and specified in the text. It is not substantially the same as any that I have submitted, or, is being concurrently submitted for a degree or diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. I further state that no substantial part of my dissertation has already been submitted, or, is being concurrently submitted for any such degree, diploma or other qualification at the University of Cambridge or any other University or similar institution except as declared in the Preface and specified in the text. It does not exceed the prescribed word limit for the relevant Degree Committee.

Jess Thompson

HEADS, SHOULDERS, KNEES AND TOES: EXPLORING BODIES, BODY PARTS AND PERSONHOOD IN LATE NEOLITHIC MALTA THROUGH FUNERARY TAPHONOMY

Abstract

This research addresses the body and personhood in late Neolithic Malta (c. 3600–2300 cal BC) by reconstructing funerary practices at two collective burial sites: the Xemxija Tombs (Malta) and Xagħra Circle (Gozo). The range and sequence of funerary practices are identified through implementing taphonomic analysis to classify the condition and modification of bone and explore dominant trends in depositional practice. Although the extensive disarticulation and fragmentation of remains has received considerable attention, the timing of post-mortem interactions has been largely overlooked. Yet, the temporality of mortuary practices is crucial for understanding the social dimension of the process of death and dying, revealing how the identity of the dead is transformed. This work further explores how mortuary rites responded to understandings of the body held during life. To do so, the treatment of the dead body is placed in its social context, integrating burial treatment, bioarchaeological evidence and material culture—particularly the corpus of anthropomorphic figurines—to provide a new interpretation of personhood in late Neolithic Malta.

Analysing the full assemblage of human remains from six rock-cut tombs at Xemxija, and between 9.3–100% of the assemblage from 16 contexts at the Xagħra Circle, this research finds a predominant practice of primary interment and subsequent disarticulation in most burial spaces. Disarticulation typically focussed on the selective removal of crania and long bones, and long bones are demonstrated to have been removed from the Xemxija Tombs. Careful analysis shows this was an extended process, in which the memory of the dead was maintained over several generations and social death was prolonged. Significantly, this practice was inclusive of individuals from foetal to old adult in age and was not biased according to sex.

Aligning the life-course with the death-course, a pervasive interest in modifying the body is evident. The fragmentation of dead bodies and figurines indicates bodily partibility enacted across multiple media. These new results reveal corporeal practices which extended from life into interactions with the dead. However, in all contexts, the body is figured and constructed in diverse ways, revealing that personhood was founded on difference. Altogether, bodies are shown to be complex and multiple entities in both life and death, and the integration of bodies in their varied forms was significant. This research offers new insights into the 'body worlds' of Neolithic Malta which has implications for understanding socio-political dynamics. This thesis demonstrates the significance of a holistic analysis of bodies and personhood in the past.

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Abbreviations

API	Anatomical Preservation Index
BMD	Bone Mineral Density
BRI	Bone Representation Index
BRX	Brochtorff Xagħra Circle site code from 1987–1994 excavations, used to refer to project archive
FFI	Fracture Freshness Index
FRAGSUS	Fragility and Sustainability in Island Environments, ERC-funded Project
LGM	Last Glacial Maximum
MNE	Minimum Number of Elements
MNI	Minimum Number of Individuals
NISP	Number of Identified Specimens
NMA	National Museum of Archaeology, Valetta, Malta
PMI	Post-Mortem Interval
SER	Skeletal Element Representation
QBI	Qualitative Bone Index
UCL	Institute of Archaeology, University College London, UK

Pronunciation

Ċ/ċ (as in Taċ-Ċawla): Pronounced as a "ch" sound, as in "church", i.e. Ta-chow-la

Ġ/ġ (as in Ġgantija and Żebbuġ): Pronounced as a "j" sound, as in "jump", i.e. Jih-gan-tee-ya, or Zeh-buj

J/j (as in Mnajdra): Pronounced as a "y" sound, as in "yard", i.e. Em-ny-drah

Għ/għ (as in Għar Dalam): Producing this sound requires constriction of the pharynx or epiglottis, uncommon in English, effectively sounding like AR da-lum

Ħ/ħ (as in Ħal Saflieni): An aspirate or whispered 'h', as in "how", i.e. Hal Saf-lee-eh-nee

Q (as in Ħaġar Qim): This signifies a glottal stop, i.e. Haj-ar EEM

X/x (as in Tarxien): Pronounced as a "sh" sound, as in "shin", i.e. TAR-sheen

Xagħra: Pronounced SHAH-ruh

Xemxija: Pronounced Shem-SHE-ya

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💀💀💀

CHAPTER ONE

INTRODUCTION

"…sometimes I think we must be walking on shoals of bodies without realising it and all the earth's a graveyard"
—Sarah Perry, 'The Essex Serpent' (2016, 104).

1.1 The emergence of collective deposition in the Neolithic

The dead were particularly visible and active in the Neolithic. They were present in larger numbers than ever before, frequently accorded careful and complex funerary treatment, and often continued to be drawn into social relationships and practices. Prior to c. 4500 BC, the presence of the dead in the landscape was largely ephemeral (Harris *et al.* 2013, 69). However, between the fourth–third millennium BC, in many areas across Europe, the dead were deposited successively over generations within monumental spaces (Bayliss and Whittle 2007; Joussaume 1988; Tomé *et al.* 2018). This period has been framed as a 'big transition' (Robb 2014), encompassing significant changes not only in funerary practices, but also in configurations of gender identity, personhood and socio-political organisation (Borić *et al.* 2013; Robb 2007a; Robb and Harris 2018; Thomas 1999). Collective burial traditions regularly encompassed practices of secondary deposition and curation, attesting to ongoing interactions between the living and the dead. In gathering together and maintaining relations with large numbers of the dead, burials were often sited in significant places in the landscape, weaving together important nodes of Neolithic worlds (Borić *et al.* 2013, 53; Bradley 1998; Whittle 2003).

Collective deposition emerged alongside the spread of megalithic monuments across the Atlantic façade from the second half of the 5th millennium BC (Figure 1.1; Laporte & Scarre 2016; Schulz Paulsson 2017, 2019). There is notable regional variability according to whether collective depositions were first present in underground spaces, including rock-cut tombs, caves, pit graves and hypogea, or within above-ground monuments. The expansion of megalithic tombs occurred over the course of c.1500 years, likely originating in northwest France (Schulz Paulsson 2017, 2019). Within approximately 300 years, megalithic monuments were also constructed in southern France, the Channel islands, Corsica, Sardinia, peninsular Italy and coastal Iberia (Schulz Paulsson 2019, 3463). In the central Mediterranean, however, subterranean burials formed the dominant tradition (Guilaine 2015; Whitehouse 1972, 1992). In the Maltese archipelago, the monumental 'temple' structures and complexes are exceptional examples of megalithic architecture, constructed from at least 3700 cal BC (McLaughlin, Reimer, and Malone forthcoming), but burial structures remained underground throughout the Neolithic (Evans 1959; Malone *et al.* 2009; Trump 2002).

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Figure 1.1: Regions exhibiting megalithic architecture in Europe and North Africa (Schulz Paulsson 2017, 2).

Collective burial sites usually contained <100 individuals, and often only several dozen, but in some regions there are notable exceptions. Within the hypogea of southern France, these include Les Boileau in Sarrians, in which at least 350 individuals were interred, and Le Capitaine in Grillon, with a Minimum Number of Individuals (MNI) of 176 (Chambon 2003, 328; Sauzade 1998, 295). In southern Spain, grave 40 at Los Millares in Andalucía contained 114 individuals (Molina González and Cámara Serrano 2005) and Carada cave in Huéscar entombed >168 individuals (Cámara Serrano and Caramé 2009). Further to the west, in Portugal, 340 individuals are attested at Casa da Moura cave, and in the São Paulo II hypogeum a MNI of 254 was reached (Boaventura 2009). In the central Mediterranean islands, collective deposition of small numbers of individuals was common, but there has generally been little attempt to engage with funerary practices; on Corsica, this is due to poor bone preservation (D´Anna *et al.* 1998), and on Sardinia, many Domus de Janas were looted or the bones poorly preserved (Melis 2012). Sicilian Copper Age tombs often contained only several inhumations, but from the late Copper Age funerary practices increased in variety and incorporated up to 50 individuals (e.g. Mannino 1971; Tusa 1994).

Across Europe, Neolithic funerary practices were exceptionally varied, such that it is often difficult to define a predominant tradition within sites or regions. This is particularly true during the fourth–third millennium BC, when large swathes of Europe were engaged in distinct cultural and material practices; pockets of the late Neolithic remained (e.g. in Malta, Britain and northern Europe), bracketing Copper Age communities in the central Mediterranean and Iberia, with the early Bronze Age emerging in east and southeast Europe. In common across much of this area, however, was the significance of returning to the dead and interacting with their remains. This has sparked considerable debate as to the nature of personhood and the construction of the self (e.g. Borić *et al.* 2013; Fowler 2010; Harris 2018; Hofmann and Whittle 2008). The Neolithic may be thought of as a turning point in the understanding and treatment of the body in both life and death. As Bailey (2005, 146) remarks, a "fundamental reformulation of the materiality of the body and of people's conception of articulations between being and body" was initiated. Complex and varied ontologies were mediated in practices extending beyond the funerary realm, and bodies gained significance as the locus for mediating the world and inscribing complex facets of identity.

1.2 Latecomers: collective deposition on the Maltese islands

Collective deposition is evident on the Maltese islands from the early 4th millennium BC (Baldacchino and Evans 1954; Evans 1971), just slightly later than several rock-cut tombs (*tomba a forno*) known from southern Italy (Whitehouse 1972). This period on the Maltese islands marked the start of the late Neolithic, commonly referred to as the 'temple period' culture due to the construction of large megalithic complexes. While this period is ametallic, and therefore culturally Neolithic, contemporaneously across the central Mediterranean the Copper Age (or Chalcolithic) was emerging. The complex and distinctive culture of late Neolithic Malta developed alongside wider socio-political reorganisation across the central Mediterranean and beyond, reaching its apogee in the mid-4th millennium (Robb 1994, 2007a).

A distinct funerary tradition developed, with caves, hypogea and rock-cut tombs used to inter large numbers of the dead. Excavators' accounts note that these burial spaces contained multiple individuals in various states of preservation and articulation (Baldacchino and Evans 1954; Evans 1971; Malone *et al.* 2009; Tagliaferro 1911; Zammit 1928). Many were excavated by antiquarians who frequently did not record or recover the skeletal remains. Even at Xemxija, where six rock-cut tombs were excavated in 1955, the human remains were not recorded *in situ* (Evans 1971, 112–116). The re-discovery of the location of the Xagħra Circle in the mid-1960s and its excavation from 1987–1994, recovering >200,000 fragments of human bone representing at least 800 individuals, provided the first opportunity for large-scale bioarchaeological analysis of a sample of the population of Neolithic Malta. To date, the Xagħra Circle remains the only Neolithic Maltese population with published bioarchaeological analysis (Stoddart, Barber *et al.* 2009). This is partly due to the antiquarian excavation of many rock-cut tombs and, in the case of the UNESCO-designated Ħal Saflieni hypogeum, the subsequent loss of much of the osseous material (Malone, Stoddart, Bonanno, *et al.* 2009, 8).

Much research on the Maltese Neolithic to date has focused on ceramic typology (Evans 1953; Trump 2004), monumental architecture, function and setting (Anderson and Stoddart 2007; Barratt *et al.* 2018; Evans 1996; Grima 2008; Malone 2018; Robinson *et al.* 2019), as well as art and figurative representations (Malone 2008; Malone and Stoddart 2017; Pace 1996; Vella Gregory and Cilia 2005). Scholarship has especially been concerned with defining social organisation, politics and the extent of connectivity between the islands and peninsular Italy, with contrasting accounts presented for the role this played in the construction of local identities (Bonanno *et al.* 1990; Robb 2001; Stoddart *et al.* 1993). Only recently has it been argued that social stability, within the ecological and environmental constraints of the islands, would have been more greatly ensured through consensus and co-operation (Cazzella and Recchia 2015; McLaughlin *et al.* 2018; Vella 2016). Where these accounts agree, however, is the significance of ritual in the Maltese islands, in contrast to the growing importance of trade and economy on mainland Italy.

Explorations of the body in Neolithic Malta have drawn on the figurative record, funerary practices and phenomenological approaches (Bonanno 2014; Malone and Stoddart 1996; Stoddart, Barber *et al.* 2009; Stoddart and Malone 2008; Turnbull 2002; Vella Gregory and Cilia 2005). The increased size of figurines, intensified funerary activity, and emphasis on restricted access within the temples, suggests the body became a core focus from 2900 cal BC (Stoddart and Malone 2008, 22). Syntheses have particularly emphasised the ritual context and deployment of figurines and drawn links with ancestral rites. The striking heterogeneity of the figurative corpus has been noted (Vella Gregory and Cilia 2005, 19). However, the significance of this for contemporary understandings of the body and personhood, and the potential for alignment between the burial and the figurative record, has yet to be fully realised.

The commingled human remains excavated from the Xemxija rock-cut tombs (Evans 1971, 112–116) and the Xagħra Circle rock-cut tomb and hypogeum (Malone *et al.* 1995; Malone, Stoddart, Trump, *et al.* 2009) represent the largest collections of Neolithic skeletal material from the Maltese islands. These assemblages therefore provide an excellent opportunity to redress biases in earlier research. The Maltese Neolithic is often marginalised in the literature, from both an archaeological and bioarchaeological perspective. In a recent review, it was stated that “no information on the human remains is available” from the Xagħra Circle, despite the publication of the site monograph several years previously (Martin *et al.* 2013, 118). The outcomes of this research will contribute significantly to reframing the position and understanding of the Maltese islands in national and international discourse on funerary practices in Neolithic Europe. Since the original analysis of the Xagħra Circle, the field of funerary taphonomy has advanced considerably (Knüsel and Robb 2016). This method is underscored by its focus on reconstructing the ritual process of burial, investigating how the dead are ontologically transformed, and viewing the treatment of the dead as a nexus through which individual identity and cultural beliefs are negotiated.

1.3 Research aims and objectives

This project employs the methodological and theoretical agenda of funerary taphonomy to provide a detailed understanding of the treatment of the dead in late Neolithic Malta, focussing on two of the largest known burial sites, the Xemxija Tombs (c. 3500–2450 cal BC) and Xagħra Circle (c. 3600–2300 cal BC). Several core questions structure this research:

1) What happened to the dead: how were dead bodies deposited and treated between 3600–2300 cal BC?
2) What does the range and sequence of funerary practices reveal about the process of dying and the ontological status of the dead?
3) How does the treatment of the dead body relate to the identity of the deceased, specifically age and sex?
4) When placed in socio-cultural context, what does this reveal about the nature of bodies and personhood in late Neolithic Malta?

Both the Xagħra Circle and the Xemxija Tombs are long-term usage assemblages (following Osterholtz *et al.* 2014a, 2). In common with many prehistoric tombs, deposition of the dead occurred for an extended period, resulting in high levels of commingling and fragmentation. Uniquely for the Neolithic, however, radiocarbon dates from both the Xagħra Circle and Xemxija Tombs span a millennium. Long-term usage assemblages are typically categorised according to predominant funerary practices: primary or secondary deposition. There is a lack of information regarding the placement of the human remains in the Xemxija Tombs. At the Xagħra Circle, extensive disarticulation, and the apparent absence of cutmarks and animal intervention, complicates our understanding of the post-mortem treatment of the dead (Stoddart, Barber, *et al.* 2009, 317). This research therefore seeks to identify the full range of funerary practices at both sites. While the commingled and largely disarticulated nature of the skeletal remains has been commented on, little is known about the timing of these interventions. For example, were individuals always deposited soon after death, and were remains disarticulated when fleshed or skeletonised?

‘Taphonomic time’ is relative, but when combined with Bayesian modelling of radiocarbon dates and stratigraphic analysis of the remains at the Xagħra Circle, diachronic patterns in funerary treatment can be traced. Funerary practices can thus be analysed at multiple temporal scales: at the level of depositional episodes, as sequences of action throughout stratigraphic levels, and across multiple generations. Unravelling the temporality of engagements with the dead reveals how the boundary between life and death was negotiated. For example, were earlier depositions forgotten or memorialised? Were ancient remains treated distinctly compared to the more recently deceased? The answers to these questions will bring us to a fuller understanding of the ontological status of the dead, including what the continued interaction with human remains reveals about the social position, value and agency of the dead.

These methods facilitate broader contextualisation of the mortuary record, asking how bodies were shaped through lived experiences, across the life-course, and represented in material culture. With such a large dataset at hand, the relationship between funerary practices and the construction of the body throughout the life-course can be examined. Bioarchaeological analysis of age and sex (where possible), provides insight into the relationship between identity, personhood and post-mortem treatment. Personhood has been a recurring feature of debates engaging with the burial record and material culture in Neolithic Britain (Fowler 2001, 2002; Harris 2018; Jones 2008), and the Mediterranean (Robb 2002, 2009; Skeates 1994; Whitehouse 2013), but has yet to be centred in discussions of the body in late Neolithic Malta.

Altogether, the synergy of method and theory applied in this research provides an updated and novel analysis of funerary practices and their implications for understanding the wider ‘body world’ (Harris and Robb 2013a, 3) of this period. Death and dying are social processes; they are biological realities which are culturally constructed through understandings about the body (Kellehear 2007; Robb 2013). Lived experiences and beliefs about the body therefore provide the foundation for interactions with the dead. Reconstructing funerary practices over approximately 1300 years provides a long-term perspective not just on the treatment of the dead, but also the history of the body in late Neolithic Malta.

1.3.1 The FRAGSUS project

This research was carried out alongside the European Research Council (ERC) funded FRAGSUS project (2013–2018), which addressed the collapse of the late Neolithic 'temple' period culture through assessing the relative fragility and sustainability of the island landscape and environment (Stoddart 2014). The project encompassed several seasons of excavation at new sites, as well as re-evaluating previous excavations, a large scheme of radiocarbon dating, re-analysis of ceramic typology, extensive geoarchaeological prospection, and a new phase of bioarchaeological analysis of the Xagħra Circle burial population.

To facilitate the latter, the Population History Workgroup was initiated, comprising a team including Dr. Ronika Power, Ms. Bernardette Mercieca-Spiteri, Dr. Jay Stock, Dr. Rowan McLaughlin, Dr. Tamsin O'Connell, Eóin Parkinson and myself. The workgroup was principally concerned with characterising the health and demography of the burial population through a suite of techniques including osteological and palaeopathological analyses, aDNA, isotope analyses, dental anthropology, long bone cross-sectional geometry, and the subject of this research—taphonomic analysis. Within the remit of the FRAGSUS project, all remains located in the Xagħra Circle archive at the NMA were visually examined, and full analysis carried out on a selected sample of dentition alongside notable cases of trauma and palaeopathology. Samples for radiocarbon dating, dietary and mobility isotopes, and aDNA were taken from contexts of interest. The first radiocarbon dates and dietary isotopes were also obtained from human tissue from the Xemxija tombs.

As part of this team, I have analysed skeletal remains largely from contexts which were selected for the above analyses, ensuring this research contributes to the wider project results. This study therefore does not aim to directly address demography, subsistence or palaeopathology, as these form the subject of research by other colleagues on the FRAGSUS project. The outcomes of taphonomic analysis benefit greatly from the combined efforts of the FRAGSUS team, allowing their integration with wider bioarchaeological and environmental insights.

1.4 Research methods

Commingled assemblages are complex to work with and each presents different challenges. As such, methodologies must be flexible and closely aligned with research questions (Baustian *et* *al.* 2014, 267). This research applies the methodological framework of funerary taphonomy, which aims to reconstruct deathways and interactions with the dead. Such a focus naturally leads to a theoretical approach which highlights the socio-cultural construction of death, dying, and the dead body.

1.4.1 Defining terms

Terminology to describe skeletal remains and depositional practices is outlined in Table 1.1 (Duday 2009; Knüsel 2014; Knüsel and Robb 2016). Throughout, I have endeavoured to steer away from the use of the term 'burial' in a general sense. Instead, 'deposition' is preferred, referring to processes of interring and interacting with human remains, and recognising the difficulty of distinguishing whether individuals were covered with earth. Where numerous individuals are interred in the same space, a distinction is made between mass graves, graves containing simultaneous depositions for socio-cultural reasons (i.e. multiple depositions), and collective depositions, which encompass the deposition of multiple individuals in the same space consecutively (Knüsel and Robb 2016, 657).[1] Whether they are referred to as multiple, collective or commingled assemblages, these complex deposits are formed by a staggering array of practices and motivated by diverse beliefs. As there is no single set of rites by which they are formed, there is no easy single definition. In general, however, collective depositions are defined by their extended use, and often represent multiple forms of interacting with the dead, including disarticulation, fragmentation, and mixing of osseous remains with other materials. Inferring the temporality of deposition in these spaces requires bioarchaeological and archaeothanatological analyses, but these are hindered when *in situ* observation is not possible and long histories of post-depositional processes are involved.

[1] The French school of archaeothanatology argues that 'collective' is an interpretive term that should not be used during the first stage of analysis (Schmitt and Déderix 2018). Rather, the timing of interments in multiple deposits might be classified as 'simultaneous' or 'consecutive'. I contend that 'collective' remains a useful term for characterising complex funerary deposits, but ought not to be conflated with theoretical arguments, or assumed to be motivated by similar social concerns in all cases.

Term	Definition
Deposition	A general term to describe the presence of human skeletal remains on an archaeological site.
Grave	The cut feature into which skeletal remains have been intentionally placed.
Burial	The act of placing a body, or skeletal remains, into an archaeological feature, and covering the remains with earth.
Inhumation	Often used interchangeably with ‘burial’ to describe interring a body or skeletal remains but doesn’t have the connotations of covering remains with earth.
Funerary	Events surrounding the act of burial which are ritually or culturally significant.
Mortuary	Often used interchangeably with ‘funerary’, but modern connotations often recall treatment of the fleshed body soon after death.
Commingled remains	Mixed deposits of both articulated and/or disarticulated remains, often fragmented. Human remains may be mixed with animal remains, artefacts and structural debris.
Primary deposition	This indicates the original location and placement of the corpse/s, evident from the articulation of the remains which should only be modified due to decomposition. Most skeletal elements should be preserved, particularly those which disarticulate early during decomposition (e.g. labile joints of cervical vertebrae and extremities).
Secondary deposition	Intentional removal of remains from their primary location for re-deposition elsewhere. This may indicate a delay between death and deposition but can also apply to the removal of elements from a skeleton. Articulations will have been disrupted (especially persistent joint articulations) and remains may be placed in a structured manner.
Reduction	Originating from Duday (2009, 72), this is distinguished from secondary deposition by the lack of forethought involved in the movement of remains and is used to denote the clearance of remains in the same container or burial chamber to make space for a successive deposition.
Multiple deposition	Simultaneous placement of multiple individuals in the same location. The timing of the event should be indicated by a close relationship between the remains.
Mass grave	The simultaneous deposition of multiple individuals in a single location, often following a disaster or epidemic, indicated by many individuals remaining in articulation. Skeletal position may be disordered, but there are often similarities amongst the individuals relating to the manner or cause of their death.
Collective deposition	Deposition of multiple individuals in the same location at different times. These may incorporate secondary depositions and, as a result of varied practices and the time lapses between interments, some articulations will be disrupted and all individuals may not be complete.
Multiple successive inhumation	Primary deposition of complete bodies successively over time in the same location. This is difficult to infer and depends on the length of time a single feature is in use. If successive inhumation is fast, lower individuals may remain intact; if the process is protracted, they may be in varying levels of articulation. Also known as ‘subsequent deposition’ (Robb 2016, 690).

Table 1.1: Recommended funerary terminology in bioarchaeology collated from Duday (2009), Knüsel (2014), and Knüsel and Robb (2016).

1.4.2 Analysing collective burials

The literature on Neolithic collective burials reveals some themes which have had lasting influences, most notably relating to identity, politics and the ancestors. Reconstructing socio-political organisation through the burial record was especially prevalent in processual narratives of the 1970s–80s (Binford 1971; Pader 1982; Saxe 1970; Thorpe and Richards 1984). Attempts to identify patterns in early Neolithic depositional practices led to suggestions that burial treatment reflected facets of identity, especially age and gender (e.g. Kinnes 1981; Thomas 1988; Thomas and Whittle 1986), although it should be noted that any patterns are generally site-specific (Edwards and Pope 2013). Furthermore, the collective nature of early Neolithic burials has traditionally been argued to represent an ideology of corporate ancestry, in some cases through masking emerging social differentiation (Barrett 1994; Edmonds 1999; Shanks and Tilley 1982; Thomas 1999).

On the other hand, Italian scholarship, still largely rooted in the traditions of culture-history, has been particularly concerned with distinguishing cultural trends in funerary practices (e.g. Bailo Modesti and Salerno 1998, 175). During the 3rd millennium BC, both collective deposition in rock-cut tombs and single burial co-existed in northern and central Italy (Pessina and Tiné 2008). Much attention has been paid to individuating depositional modes based on perceived cultural traditions, often failing to acknowledge that most cultures practice multiple forms of deposition (e.g. Barfield 1986). Population demographics within collective burials have generally not been exhaustively quantified, yet there appears to be some evidence for gendered grave good assemblages (Dolfini 2006; Skeates 1995; Trump 1966a).

Emerging from post-processual analyses of corporeality, agency and personhood (e.g. Butler 1993; Csordas 1994; Hamilakis *et al.* 2002; Sofaer 2006), burials are increasingly framed as a dynamic arena in which social identity and relations are negotiated. Contemporary Western notions of personhood have been problematised, arguing particularly through Strathern's (1988) work in New Guinea that persons were composed in diverse ways through their relationships with people, animals, materials and places (e.g. Fowler 2001, 2004a, Jones 2005). Research in this vein produced rich narratives of Neolithic identity and cosmology, destabilising the projection of contemporary perspectives into the past. However, theoretical engagement with burial data routinely emphasises the *outcome* of funerary practices. Reconstructing the processes of engaging with the dead provides a much more insightful pathway for understanding the role of the dead in the construction of personhood and bodily ontologies.

Research over the past two decades amply demonstrates the value of re-analysing commingled assemblages. Methodological advances have provided ways to approach disarticulated and fragmented skeletal remains and reconstruct funerary practices (Adams and Byrd 2014; Duday 2009; Knüsel and Robb 2016; Osterholtz, Baustian, Martin, *et al.* 2014b). Furthermore, archaeological discourse has developed a vocabulary for working with bodies and changing ritual practices (Harris and Robb 2013b; Rasmus Brandt *et al.* 2015), and there has been a renewed interest in integrating theory and method (Osterholtz 2016; Osterholtz, Baustian, and Martin 2014b). Recent scholarship on collective and commingled depositions highlights several themes:

- Distinguishing modes of deposition within and between sites (e.g. Beckett 2011; Conti *et al.* 1997; Crozier 2018; Mack *et al.* 2016; Smith and Brickley 2009).
- Investigating post-depositional movement of remains through refitting and spatial analysis (Beckett 2011; Rogers 1990; Wilhelmson and Dell'Unto 2015).
- Reconstructing lifeways and mobility, especially through isotope analyses (e.g. Díaz-Zorita Bonilla *et al.* 2018; James *et al.* 2019; Szostek *et al.* 2014) and osteobiography (Edinborough and Stefanovic 2015; Robb 2002).
- Kinship and relationality, especially using aDNA (e.g. Alt *et al.* 2016; Deguilloux *et al.* 2011; Haak *et al.* 2008; Lee *et al.* 2014; Meyer *et al.* 2012).
- Sequences of deposition and histories of practice through Bayesian modelling of radiocarbon dates (Aranda Jiménez *et al.* 2018; Bayliss and Whittle 2007; Schulting *et al.* 2010; Whittle 2018).
- Bodily ontologies, relational personhood, and post-anthropocentric perspectives (e.g. Banfield 2018; Duncan and Schwarz 2014; Harris 2018; Moutafi and Voutsaki 2016).

The role of archaeological science in characterising commingled assemblages is abundantly clear. Although deathways are increasingly addressed as complex social rites, there is still a disconnect between theory and method. For example, statements that collective burial deposits reflect the veneration of communal ancestors are still appearing (e.g. Negroni Catacchio 2011; Stoddart 2015; Triantaphyllou 2016), without detailed consideration of how ancestors are constructed and what role they may have played in social life. Furthermore, as Moutafi and Voutsaki (2016, 788) argue, "commingling is often directly associated with dividual personhood (cf. Fowler 2004a), and secondary treatment is simply viewed as the final milestone of funerary rituals, bringing about the dissolution of personal identities to a collective body of 'ancestors'". More holistic accounts of collective funerary practices are warranted; as Thomas (2018, 134) recently noted, discourse on Neolithic bodies has a tendency to "become atomized and fragmented".

These trends and limitations suggest several directions for future research: (1) multi-scalar 'big picture' narratives (see Robb 2014) of funerary practices and bodily ontologies; (2) reconstruction of lifeways and deathways, extending osteobiographical approaches to account for the social lives of the dead (Robb 2007b, 2013); and (3) more strongly intertwined theoretical and methodological analyses which question traditional assumptions (Nilsson Stutz 2016a). This research aims primarily to contribute to the latter avenue, critically assessing existing interpretations of Maltese Neolithic funerary practices by reconstructing post-mortem treatment at two of the most well-known burial sites on the islands.

1.4.3 Funerary taphonomy: a theoretically-aligned methodology

Funerary practices reveal as much about the community burying the dead as they do about the dead themselves (Baustian *et al.* 2014; Parker Pearson 1999). Burial data are not just informative of past lives but also reveal significant cultural and ritual patterns in funerary behaviour. A wide range of beliefs shape interactions with the dead, including concepts of the 'afterlife', taboo, pollution, personhood, and bodily ontologies (Bloch and Parry 1982; Douglas 1966; Huntington and Metcalf 1979; Fowler 2004a; Harris and Robb 2012). Death and dying are socially and culturally contingent processes, involving ontological transformation of the deceased, renegotiation of their role, and reorganisation of social relations (Kellehear 2007; Robb 2013). These transformations are often enacted through interactions with the dead, and some of these actions can be discerned through taphonomic analysis (Knüsel and Robb 2016).

Building up from the skeletal data to broad interpretations of cultural beliefs and behaviours, funerary taphonomy is a middle range theory as defined by Binford (1980) (Knüsel and Robb 2016; Robb 2016). The relative representation of skeletal elements is particularly used to link modes of deposition to cultural behaviour, identifying whether deposition was primary or secondary, single or collective. Detailed bioarchaeological and taphonomic analysis has revealed a complex variety of funerary practices both within and between sites of the same period. In some cases, multiple modes of secondary deposition are evident and producing 'clean', fragmented bone seems to have been the aim. This is evident at Neolithic sites in Orkney (Crozier 2016), Ireland (Geber *et al.* 2017) and Italy (Robb *et al.* 2015). In contrast, in Britain and Ireland, most interments in megalithic tombs were likely to have been primary, with subsequent processing occasionally evident (Beckett 2011; Smith and Brickley 2009). Taphonomic data therefore allow us to situate local adaptations of funerary rites within wider cultural frameworks. Reconstructing funerary practices thus highlights culturally-specific ways in which death and dying were accomplished.

1.5 Thesis structure

In the following chapter, the archaeology of late Neolithic Malta is divided into two themes: spaces of the living and spaces of the dead. Acknowledging the influence of place and space on bodies and habitus, domestic and megalithic architecture is detailed, alongside environmental evidence, economy, subsistence, and material culture. Burial sites are then discussed chronologically. Summarising current interpretations of funerary practices, I argue that more detailed understanding of the timing of engagements between the living and the dead, and the relationship between lived experiences and the manipulation of the dead, is necessary to better appreciate the ‘body worlds’ of late Neolithic Malta.

In Chapter 3, the relationship between funerary practices and understandings of the body and personhood is highlighted. Models of personhood in three regions of Neolithic Europe are summarised, providing a framework for approaching personhood in Neolithic Malta. The corpus of Maltese figurines serves as important comparative evidence for the representation of the body. From this, two key axes of personhood are expanded on, to be investigated further through funerary practices: age and gender. Drawing on ethnographic studies of mortuary rites, it is argued that the process of dying can be prolonged through continued interaction with the dead, and this provides the starting point for an archaeological perspective on dying.

Chapter 4 describes the sites studied in this research: the Xemxija Tombs and Xagħra Circle, detailing chronology, excavation methods, the context of the human remains, the history of their curation, and results of previous analyses. This discussion outlines preliminary taphonomic analysis of select remains from the Xagħra Circle and emphasises the need for comprehensive study of the Xemxija remains. The extent of disarticulation and fragmentation at both sites warrants detailed analysis to identify the full range of funerary practices.

Chapter 5 presents the methodology, outlining the development of funerary taphonomy. Factors affecting the preservation of remains are described, and the taphonomic characteristics analysed in this study are summarised. The methods of data collection and analysis employed in this study are brought together, including quantification, comparative site data, and statistical analyses, showing how they enable new conclusions regarding funerary practices to be reached.

In Chapter 6, the full results of the Xemxija Tombs assemblage are presented. The assemblage is quantified, providing an estimation of the MNI and the results of each recorded taphonomic characteristic. Several novel findings are presented, including animal damage attributed to dermestid beetles and rodents. The relative representation of elements, as a factor of the MNI, shows the over-representation of small bones as a result of primary interment and subsequent selective bone removals.

Chapter 7 details the results from the Xagħra Circle assemblage. Taphonomic results are presented, grouping contexts according to spatial location. Depositional pathways are reconstructed, revealing the lack of cutmarks, rodent, carnivore and herbivore gnawing at Xagħra, and showing that careful excavation recording is crucial for understanding the position and articulation of skeletal remains. Element representation curves from both sites are compared to several single and multiple burial sites to provide further insight into the variation of depositional modes in Neolithic Malta.

In Chapter 8, overall taphonomic results for both sites are compared, and the model of deathways for each site is brought together, investigating convergence and distinctions in the treatment of the dead at rock-cut tombs and hypogea. The data from the Xagħra Circle are further analysed spatially. Finally, key stages in the funerary programme are summarised, emphasising the temporality of interactions with the dead and the processes by which dead persons were socially transformed.

Chapter 9 places the treatment of the dead in context, returning to the question of personhood and bodily ontologies in Neolithic Malta. Combining the analysis of funerary practices with figurative representations and bioarchaeological evidence of lived experiences, an interpretation of personhood—and its intersection with age and gender—is provided. Consistent themes in the treatment of the body emphasise its partibility and mutability, indicating personhood throughout life and death was founded on difference and distinction. A chronological analysis of funerary practices reveals increasingly structured practices of disarticulation emerging from c. 2900 cal BC, and the significance of this understanding of bodies and personhood for models of socio-political organisation in Neolithic Malta is highlighted.

Finally, the Conclusion summarises key outcomes of this research and their broader implications, as well as pointing to directions for future study. In carrying out the first large-scale taphonomic analysis of funerary practices in this region, this study demonstrates diverse practices of depositing and interacting with the dead during the 4th–3rd millennium BC in the Maltese islands. Alongside research into lived experiences and wider cultural traditions, parallels between engagements with the body during life and after death are revealed. This highlights the significance of a holistic, contextual analysis of funerary practices.

CHAPTER TWO

NEOLITHIC MALTA

"The solubility of limestone, its acquiescence to water, means that [it]…is rich with clandestine places: runnels, crevasses, dens, caves, hollows, gullies. It is a landscape that has the vast, involuted surface area of a coastline, or a lung's interior. Things pool and hide in limestone, including meaning: it forms a lateral landscape, but not a shallow one."
—Robert Macfarlane, 'The Wild Places' (2008, 166).

2.1 Introduction

The Maltese archipelago comprises three small land masses in the centre of the Mediterranean Sea, 90 km south of Sicily and 500 km east of Tunisia (Figure 2.1). The islands encompass just 316 km^2 and are visible from Sicily only on a clear day. While remote, they are ideally positioned for long-distance trade with both the west and the east. This particularly shaped the islands' history from the Phoenician colonisation of the eighth century BC (Sagona 2004), although trade was integral to the successful inhabitation of the islands from the early 6th millennium BC (e.g. Chatzimpaloglou 2019; Vella 2009).

Figure 2.1: Location of the Maltese islands in the Mediterranean Sea (© Google Earth).

During the Last Glacial Maximum (LGM), Malta was linked to Sicily by a land-bridge (Figure 2.2), although there is no evidence for Pleistocene human occupation (Foglini *et al.*

2015; Furlani *et al.* 2013; Leighton 1999, 14). The local biomass and environmental resources would have been unable to support a hunting, gathering and fishing economy (Schembri *et al.* 2009). Climatic amelioration following the LGM resulted in progressive submersion of the Maltese palaeolandscape, separating Malta from Sicily by 12.9 ka and separating the three islands by 8.6 ka (Foglini *et al.* 2015). Despite the development of seafaring technologies leading to the colonisation of many Mediterranean islands around 8000 BC (Cherry 1981, 1990), Malta was not settled until the early 6th millennium BC, when sea levels were approximately at their current position (Foglini *et al.* 2015).

Recent work has identified anthropogenic activity as early as 5900 cal BC (Farrell *et al.* forthcoming; French *et al.* 2018; McLaughlin *et al.* 2018) pushing back previous dates of 5000–4600 cal BC obtained from Skorba (Renfrew 1972; Trump 1966b, 2015). Early settlers most likely arrived from Sicily, as the earliest Għar Dalam ceramic forms share affinities with Sicilian Stentinello ware (Leighton 1999, 62; Sagona 2015, 23). There is little archaeological evidence for occupation between 4800–3800 cal BC, although soils and sedimentation suggest continuous activity (French *et al.* 2018; McLaughlin *et al.* 2018; McLaughlin, Reimer, *et al.* forthcoming). Occupation of the islands was therefore largely ephemeral until the early 4th millennium BC (McLaughlin *et al.* 2018).

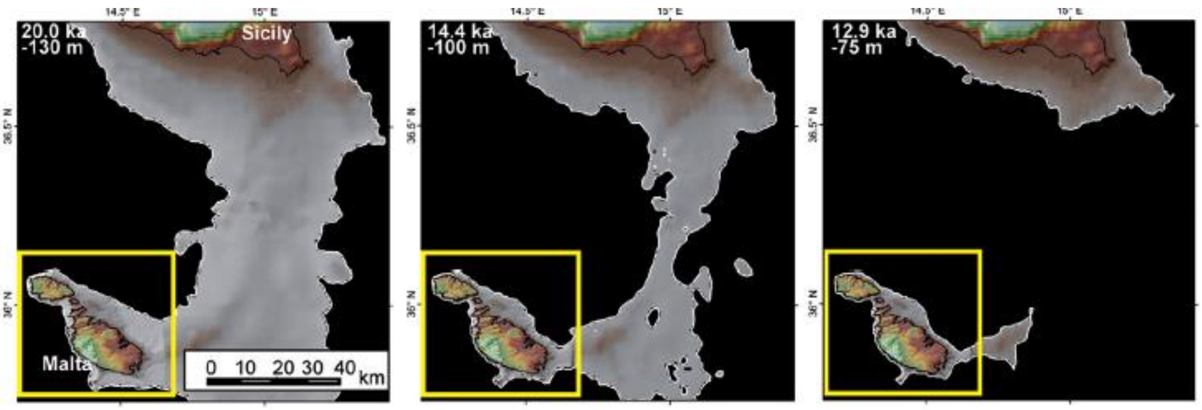

Figure 2.2: Reconstruction of the Maltese palaeolandscape from 20–12.9ka, depicting the land bridge between Malta and Sicily (Foglini *et al.* 2015, 92). Reproduced with the permission of the Geological Society.

The geology of the Maltese islands comprises five sedimentary types, with the Upper Coralline limestone capping Blue clay and Greensand formations, followed by Globigerina limestone on a base of Lower Coralline limestone (Pedley *et al.* 2002). The landscape is rugged and shaped by faults; limestone plateaux with thin soils are interrupted by steep valley slopes and fluvial systems of wadis forming valley floors (Foglini *et al.* 2015; French *et al.* 2018). The local flora consists mainly of woodland, maquis, garigue and steppe vegetation; local fauna includes a large range of bird species but indigenous mammals are small (Sultana 2004).

Woodland deforestation occurred rapidly after initial settlement due to the creation of an agricultural landscape (Carroll *et al.* 2012), leading to low supplies of wood as early as the 6th millennium BC (Farrell *et al.* forthcoming).

The Maltese islands did not provide a bountiful environment for habitation. The fluctuating population and ephemeral settlement evidence for the first millennium of their occupation betray the rocky start of early settlers. The islands required a stable and established agricultural lifestyle, including careful soil management, and the economy does not seem to have supported a flourishing population with rich material culture until the mid-4th millennium BC.

2.1.1 Chronology

The Maltese Neolithic sequence is divided into eight phases based on ceramic typology (Evans 1953; Trump 1966b). Until recently, few absolute dates from prehistoric contexts were available, but extensive radiocarbon dating by the FRAGSUS project is refining the chronological sequence (Malone *et al.* 2019; Stoddart, Hardy, *et al.* 2009). Estimated dates for each phase of the Neolithic are presented in Table 2.1. However, as discussed above, recent analyses indicate large-scale abandonment of the islands prior to the Żebbuġ phase (McLaughlin *et al.* 2018, 10) mirroring widespread population decrease across much of Europe at this time (Shennan *et al.* 2013). Toward the end of the Neolithic, the 4.2 ka climate event (c. 2200 cal BC), intensified the difficulties of occupying such a marginal landscape (McLaughlin *et al.* 2018, 3), possibly causing increased aridity or wetness in the islands (Bini *et al.* 2019).

Phase	**Estimated dates**
Għar Dalam	c. 5200–4500 cal BC
Grey Skorba	c. 4500–4400 cal BC
Red Skorba	c. 4400–4100 cal BC
Żebbuġ	c. 4100–3800 cal BC
Mġarr	c. 3800–3600 cal BC
Ġgantija	c. 3600–3300 cal BC
Saflieni	c. 3300–3000 cal BC
Tarxien	c. 3000–2500 cal BC

Table 2.1: Neolithic chronology for the Maltese islands, following Pace 2000 and Malone *et al.* 2019.

Early ceramic cultures of the Għar Dalam, Red and Grey Skorba phases represent local variations of Impressed Ware, indicating ongoing connection with the Italian peninsula. Following renewed settlement of the islands c. 4100 cal BC, economic and ritual activity intensified from the late 5th to the mid-3rd millennium BC with the construction of the earliest standing stone monuments (Renfrew 1973). Commonly known as the ‘temple period’, this phase is occasionally referred to as the Copper Age (Trump 1963), though metal was not in use until the end of the 3rd millennium BC. While contemporary with the Copper Age on mainland Italy, Sicily and Sardinia, this period in Malta is ametallic and perhaps better defined as the late Neolithic (following Sagona 2015).

The earliest phase of the late Neolithic, the Żebbuġ, witnessed new pottery influences from the San Cono-Piano Notaro culture in Sicily, alongside a distinctive funerary tradition (Sagona 2015, 49). Underground burial spaces, ranging from relatively small chambers to expansive systems of interconnecting caves (hypogea), were excavated in the Upper Coralline and Globigerina limestone. Large-scale megalithic construction began in the Ġgantija phase, with the final Tarxien phase representing the peak of ritual activity (Stoddart *et al.* 1993). Despite the prolific megalithic architecture, and rich artistic repertoire throughout this period, domestic structures remain sparse (see §2.2.1).

2.2 Living in Neolithic Malta

The Maltese islands may be thought of as a ‘stone world’, their limestone geology affecting landscape topography and influencing the placement and form of monuments (Tilley 2004). This stone world inspired a rich ritual and material culture tradition, as well as providing the spaces in which the dead were gathered together. Daily life—social relations, subsistence, economy and ritual—was carried out in this landscape of stone, encompassing routines and practices which shaped the life-course, perceptions of the body, funerary customs and related beliefs. Archaeological evidence for the built landscape, environment, diet, material culture and economy is therefore summarised below. A more detailed overview can be found in Sagona (2015), while an outline of the cultural history of the islands is provided by Evans (1959), and a corpus of sites is compiled in Evans (1971) and Trump (2002).

2.2.1 Domestic and megalithic sites

Evidence for domestic occupation across the islands is largely ephemeral, in contrast to the enduring megalithic temples.[2] Hut structures at Skorba (Trump 1966, 2015), Għajnsielem Road and Taċ-Ċawla (Malone *et al.* 1988) form the principal sites. Numerous pottery scatters and finds from caves have been reported, but their dating is problematic (Sagona 2015, 28). Continued soil erosion, alongside extensive agriculture and terracing, has likely destroyed much settlement evidence (Malone *et al.* 1988). Additionally, cave dwellings were commonly used

[2] The term ‘temple’ has been criticised for assuming a solely ritual function (Pace 1996; Grima 2008). Nevertheless, it is the most common term applied to these structures and is employed throughout this work.

in the Medieval period, with some occupied into the 19th century (Buhagiar 2012; Quintin d'Autun 1980, 39), a practice which may have destroyed prehistoric deposits. In total, just under 20 sites with known or suspected domestic evidence have been documented (Malone, Grima *et al.* 2009, 53–55), with temples often located on sites with pre-existing occupation (Sagona 2015, 28; Skeates 2010, 160). A similar number of burial sites have been recorded, while more than double the number of temples is known (Figure 2.3).

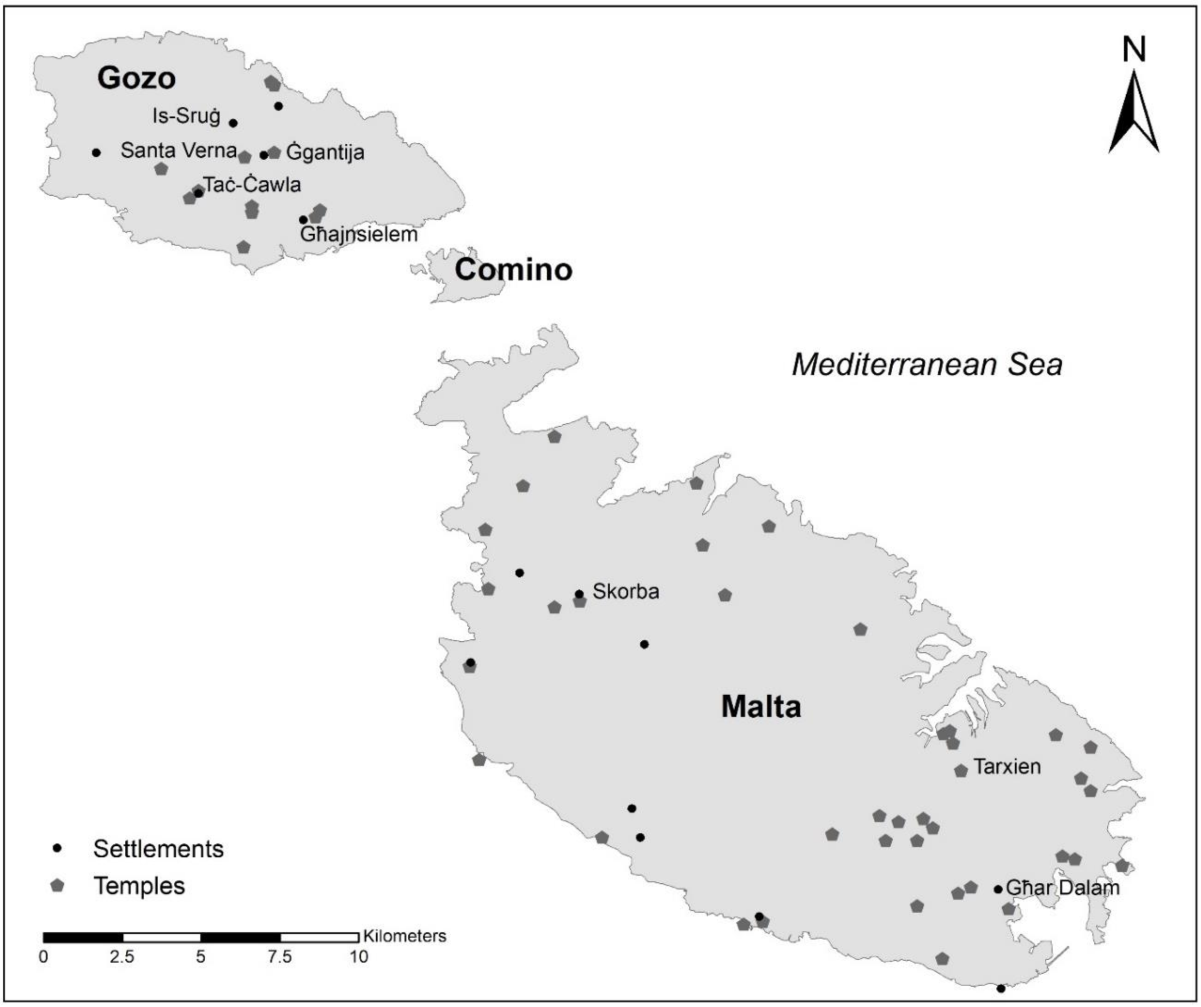

Figure 2.3: Location of settlements and 'temples', with sites discussed in text labelled.

Early Neolithic settlement is attested at Għar Dalam cave in southeast Malta, and from hut structures at Skorba (Sagona 2015; Trump 1966b, 2002). Human occupation of Għar Dalam cave throughout the Neolithic is attested by Impressed Ware sherds, in some cases mixed with Pleistocene remains in heavily disturbed deposits (Sagona 2015, 25; Sinclair & Keith 1924). Many sherds were associated with flint tools, under a layer of closely packed small stones, possibly representing a Neolithic stone floor (*ibid.*). At Skorba, at least six huts were identified in the vicinity of the temples, enclosed by an 11 m long rubble-filled wall which may have formed a boundary for the settlement (Trump 1966b, 2002, 2015). The structures at Skorba represent a small early Neolithic village with both domestic and ritual features. Some fragmentary remains of adults and children were associated with floor and refuse deposits of the Għar Dalam hut (Trump 2015). Two radiocarbon dates from the Għar Dalam layers produced dates from 5000–4600 cal BC (Renfrew 1972; Trump 1966b, 2015). Significantly, the so-called Red Skorba shrine[3] suggests that ritual and domestic use of the site was contemporary.

Late Neolithic domestic structures have been excavated on Gozo, including huts at Għajnsielem Road (Figure 2.4), Taċ Ċawla and Is-Sruġ (Malone *et al.* 1988; Malone, Grima, *et al.* 2009). At Għajnsielem Road, the partial outlines of one large and one smaller hut revealed a construction sequence including a concave foundation cut into the bedrock, packed with rubble fill and capped by multiple *torba* floors, with stone sill wall foundations (Malone *et al.* 1988; Malone, Grima, *et al.* 2009). Pillars for roof posts were uncovered in the centre of the large hut, and between the two structures. Associated finds included bone and stone tools, a quern fragment, a red ochred carved stone and numerous pottery sherds of Ġgantija to Tarxien date (Figure 2.5; Malone, Grima, *et al.* 2009). It is possible these structures formed part of a larger site, but any further evidence has since been destroyed by modern construction. The location of domestic structures on Gozo indicates that settlements were often built on the edge of, or within, agricultural valleys to exploit deeper and more fertile soils (Grima 2004; Malone, Grima, *et al.* 2009).

[3] The Red Skorba 'shrine' refers to two huts containing numerous ceramics, five fragmented female figurines, six shaped goat skulls and the remains of other domesticates (Trump 2015, 31–36).

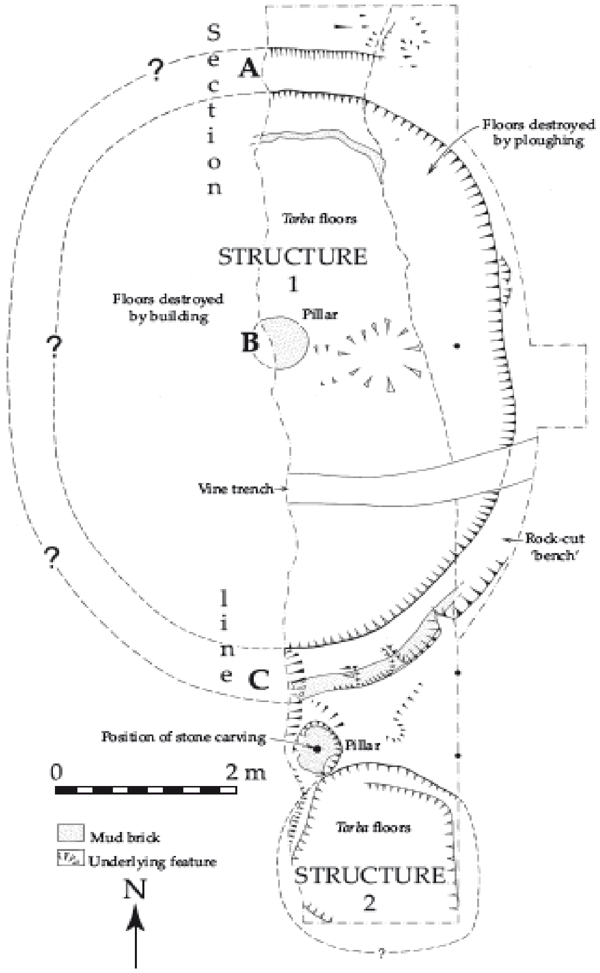

Figure 2.4: Plan of the structures at Għajnsielem Road (Malone, Grima *et al.* 2009, 47). Reproduced with the permission of Caroline Malone.

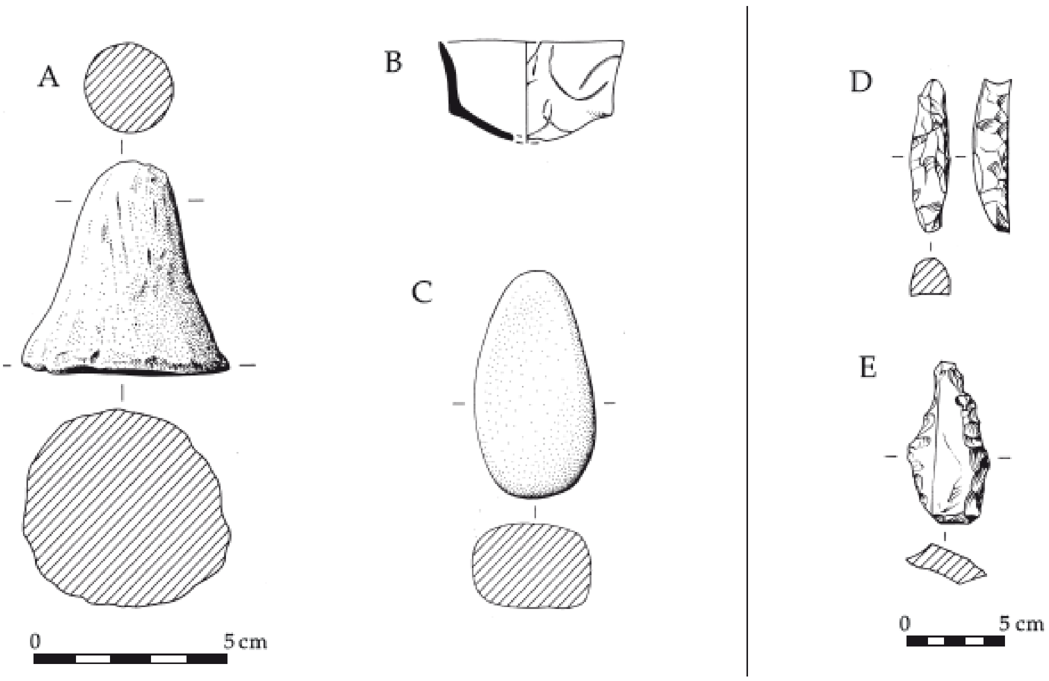

Figure 2.5: Material culture from the Għajnsielem Road huts: carved object painted with red ochre (A), fragment of miniature cup of Saflieni phase type (B), pebble polisher (C), chert borer (D), chert tool with sickle gloss (E). C. Malone, S Stoddart and D. Trump, 1988, 'A house for the temple builders: recent investigations on Gozo, Malta' in *Antiquity* 62, page 300, reproduced with permission.

Similarly, temples were typically constructed on agricultural plains or low slopes, close to springs and accessible from the shore (Grima 2002, 2008). The Ġgantija and Santa Verna temples on the Xagħra plateau are situated on a fault line, providing access to springs (Ruffell *et al.* 2018), and demonstrating the cosmological significance of water (Grima 2016a, 2016b). Most monuments follow a similar plan of oval or D-shaped apses radiating from a central paved passageway with entrances and forecourts facing south (Sagona 2015; Trump 2002). The apse walls and passages were formed with limestone blocks and at least partially capped by corbelled roofing (of which a small portion survives at Ġgantija, Figure 2.6a), set within large rubble-filled retaining walls (Figure 2.6b). When constructed with Coralline limestone, the walls were mostly plastered, and many would have been covered in an ochre wash or carved with geometric designs. The temples were furnished with stone 'altars', monumental anthropomorphic figurines, large carved stone bowls, portholes and 'oracle holes' carved into megaliths, and holes and v-perforations within orthostats which likely held skins or hangings to create screens (Sagona 2015; Trump 2002).

Approximately 30 temple structures are confirmed, while several sites with surviving limestone blocks suggest additional monuments (Sagona 2015, 88). These monuments were often constructed in groups, with some complexes containing up to four temples (Figure 2.7). Although the term 'temple' suggests a religious or ritual purpose to these buildings, this was likely not their sole use. Their location on productive areas of land, often previously occupied by dwellings (Grima and Vassallo 2008), and their accessibility from the sea, strongly suggests they were economically significant. Such evidence indicates the centrality of these monuments for maintaining cohesion and connectivity both within the Maltese islands and beyond (Barratt *et al.* 2018; Grima 2001, 2002, 2008; McLaughlin *et al.* 2018).

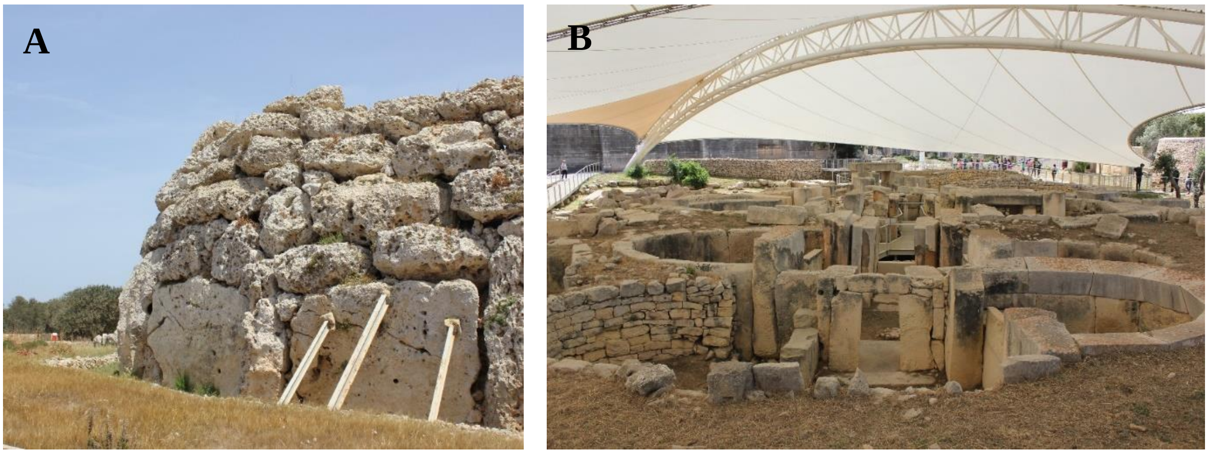

Figure 2.6a (left): Remains of corbelled roofing in situ on the north apse at Ġgantija south. Figure 2.6b (right): View from the southwest of the central Tarxien structure, showing a modern reconstruction of the rubble wall infill. Photos by author.

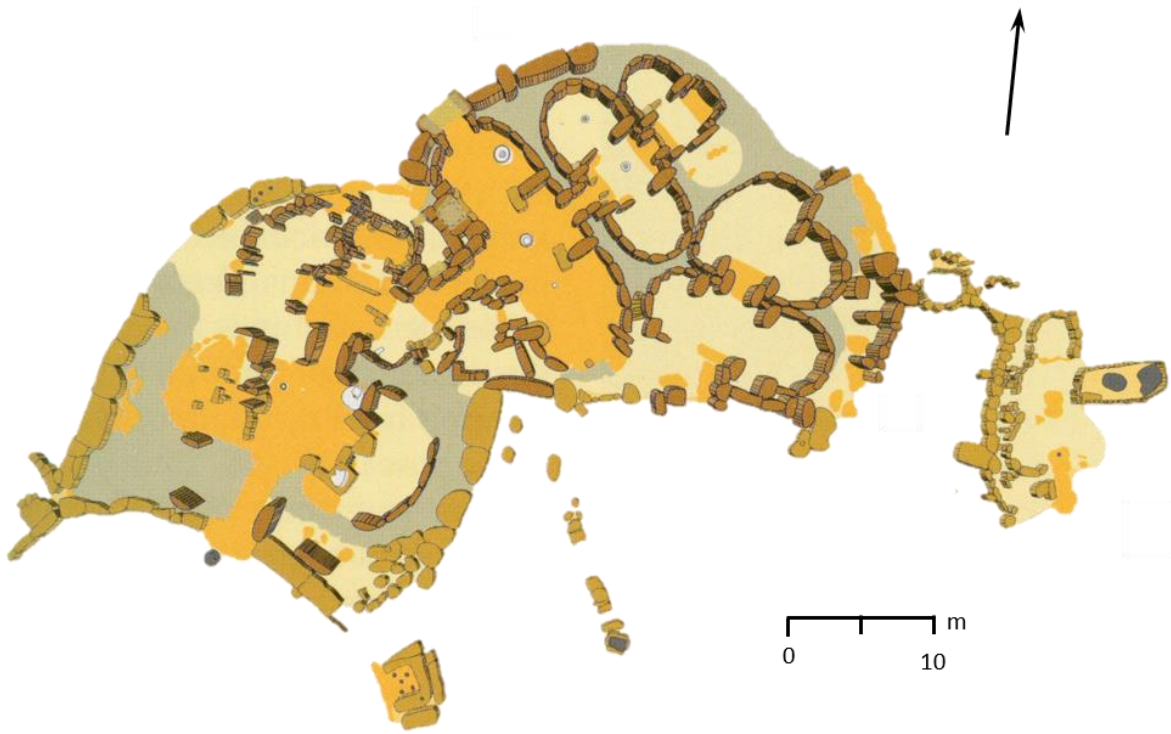

Figure 2.7: Plan of the four structures at Tarxien. The smallest megalithic structure to the east was constructed earliest, and the 6-apse structure in the centre was the latest to be built (adapted from Trump 2002, 121) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

Temple development has often been considered within an evolutionary framework of development from simple to more complex forms (e.g. Evans 1971). However, analysis has convincingly shown that their life history and development was related to the availability of natural resources, determined by the extent of surrounding productive land and the size of the local community (Grima 2008). The varied carrying capacity of areas of low slope influenced rates of population growth, leading to different trajectories of temple construction and expansion (Figure 2.8).

Furthermore, challenging processual arguments of temples as territorial markers of chiefdoms (e.g. Figure 2.9; Renfrew 1973; Renfrew and Level 1979; Stoddart *et al.* 1993), recent work strengthens the interpretation of a heterarchical relationship between these monuments and their associated communities (Bonanno *et al.* 1990; Grima 2008). Temples formed significant spaces for communal gatherings, where “collective action was celebrated” (McLaughlin *et al.* 2018, 6), perhaps in seasonal rituals (Barratt *et al.* 2018). While evidence for regular habitation is absent, features such as hearths, querns and the remains of domestic animals (some of which were sacrificed) indicates their use for elaborate feasts (Malone 2018). Activity within the monuments was often structured, with feasting remains, hearths and oracle holes found on the right side, and libation holes, troughs (or querns) and stone bowls on the left (Figure 2.10; Malone and Stoddart 2009, 372). A progression is also inferred from public, secular activities in the outer apses, to ritual activities within the inner spaces (Evans 1996; Trump 2002; Turnbull 2002).

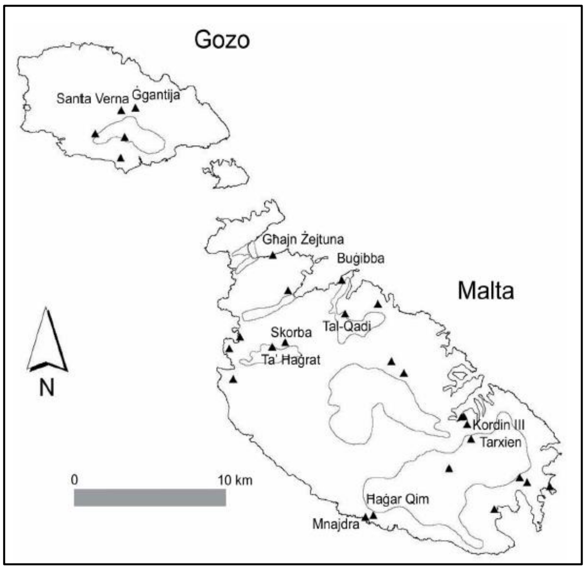

Figure 2.8: Map comparing distribution of monuments with areas of low slope (Grima 2008, 41) © Equinox Publishing Ltd 2008, reproduced with permission.

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Figure 2.9: Model of chiefdom territories based on the location of temple complexes in relation to contemporary arable land (Renfrew 1973, 154).

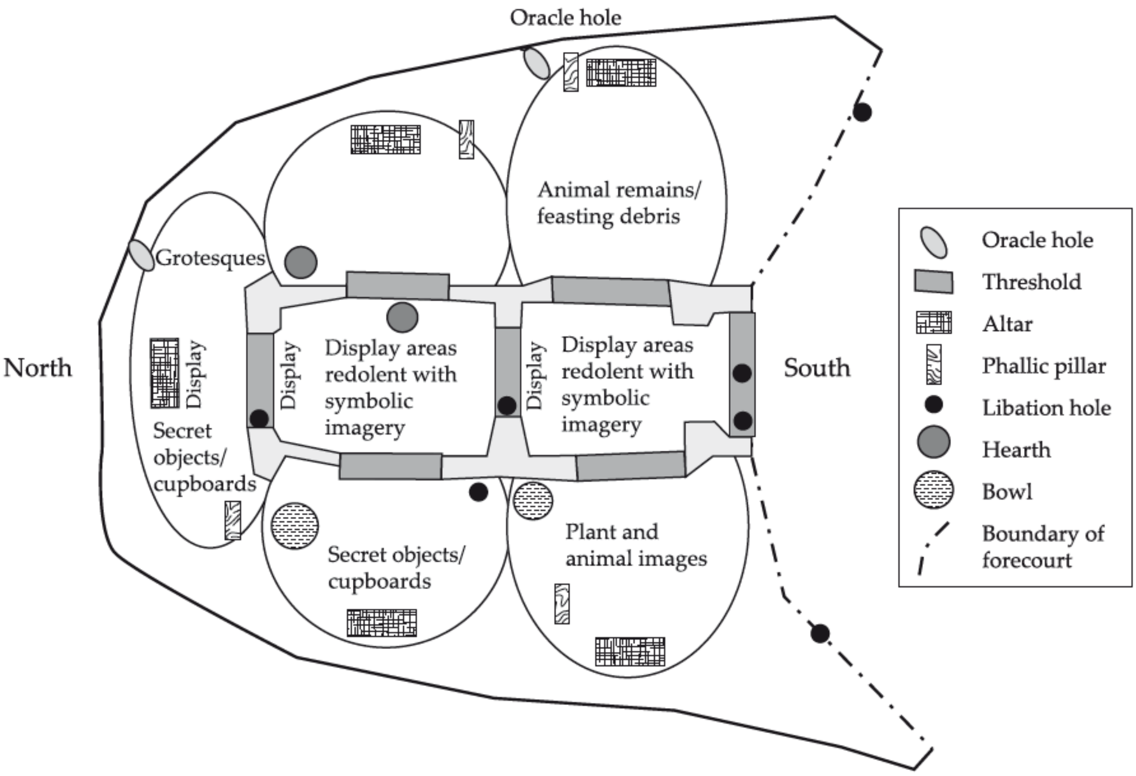


Figure 2.10: Lateralised organisation of space and activities in an idealised 'temple' (Malone and Stoddart 2009, 372). Reproduced with the permission of Simon Stoddart.

2.2.2 Environment, subsistence, material culture and economy

Estimates of the carrying capacity of Malta, accounting for cultivable land on the mesa tops and agricultural plains, suggests the island supported around 5000 people (Grima 2008, 52). Territories may have been organised around areas of productive land which reached carrying capacities at different times (Grima 2008). Sustaining the population through agriculture and animal husbandry necessitated flexibility, leading to the management of soils and construction of terraces. Geoarchaeological analysis of soil samples from the Santa Verna and Ġgantija temples on Gozo has revealed changing land use throughout the Neolithic (French *et al.* 2018). Well-developed, brown clay-enriched soils, absent across the islands today, were present near both sites before the 4th millennium BC (*ibid.*, 355). These soils gradually became drier, thinner and redder due to sustained agricultural activity, erosion and aridification. To improve their quality, organic midden-like material (including ceramic fragments, charcoal and bone) was incorporated from the mid-late 3rd millennium BC (*ibid.*).

Stable isotope analysis of $\delta^{13}C$ and $\delta^{15}N$ of individuals from the Xagħra Circle and Xemxija Tombs indicates subsistence was based almost solely on terrestrial fauna, with meat and dairy providing a large contribution to the diet (Figure 2.11; McLaughin *et al.* forthcoming; Richards *et al.* 2001; Stoddart *et al.* 2009).[4] Cereal grains from across the islands identify the presence of cultivated barley, wheat, lentil and pea (Helbaek 2015; Trump 1966b). Faunal remains from domestic, megalithic and burial sites comprise a high number of sheep/goat remains, alongside cattle, pig, and dog, and very few bird and fish bones (Pike 1971a; F. McCormick pers. comm.). Many animal bones were fragmented to access the marrow, suggesting either dietary stress (F. McCormick pers. comm.) or culinary choice. The zooarchaeological and archaeobotanical evidence is consistent with a diet based on terrestrial, domesticated fauna alongside cultivated crops. In accordance with most of the European Neolithic population, there is no evidence of a marine contribution to the diet. However, earlier isotopic studies of Xagħra remains (Richards *et al.* 2001; Stoddart, Barber, *et al.* 2009) did not utilise a faunal baseline and even the most recent work (McLaughlin, Power *et al.* forthcoming) has not established a baseline measurement for marine species.[5]

[4] Dietary isotopes were analysed from seven individuals from the rock-cut tomb and hypogeum at the Xagħra Circle by Richards *et al.* (2001), followed by 28 individuals by Stoddart, Barber *et al.* (2009). The FRAGSUS project sampled 224 teeth from the Xagħra Circle (although some teeth were exfoliated and do not represent discrete individuals) as well as 5 exfoliated teeth (from 5 discrete individuals) from the Xemxija tombs (McLaughlin, Power *et al.* forthcoming).

[5] Fish bones in the central Mediterranean have notably low $\delta^{13}C$ values (Craig *et al.* 2009), but it is unclear whether this was also the case in Malta.

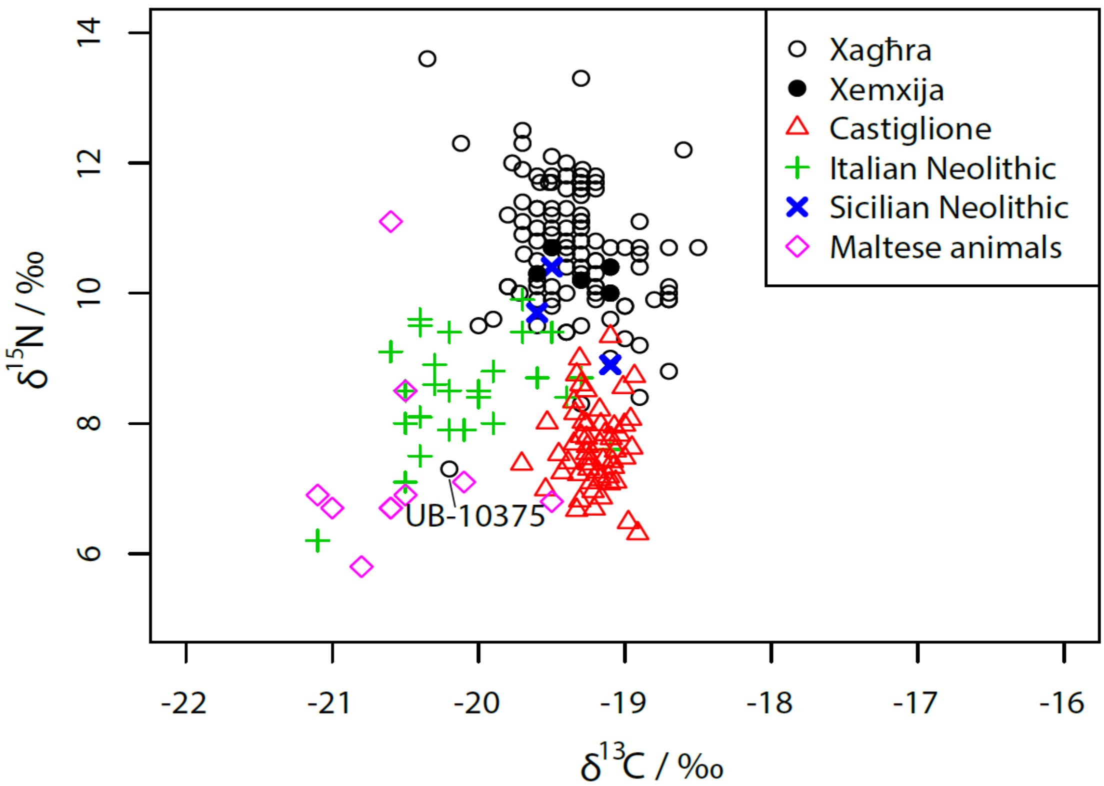


Figure 2.11: Stable isotope values from human remains at Xagħra and Xemxija compared to Maltese faunal remains and other central Mediterranean populations (McLaughlin, Power *et al.* forthcoming). Reproduced with the permission of Rowan McLaughlin.

Material culture indicates fluctuating connections beyond the islands. Ceramic styles were markedly more localised from the Żebbuġ period, with form and decoration lacking parallels in Sicily and southern Italy (Figure 2.12; Trump 2002). Some notable sherds of non-local manufacture indicate connections with Sicilian Serraferlicchio and Sant'Ippolito cultures and the Liparian Piano Quartara group (Evans 1971, 223; Malone, Bonanno, *et al.* 2009, 238; Trump 2002, 212–13). Recent provenancing has located an ochre source in the local Ooid formation, demonstrating similar elemental composition with prehistoric ochre samples and challenging earlier assumptions that all ochre was imported from Sicily (Attard Montalto *et al.* 2012). Lithics from non-local sources were especially prevalent, including obsidian, flint, chert, ground stone and, rarely, jadeite (Trump 2002; Malone, Bonanno, *et al.* 2009; Robb and Farr 2005; Vella 2009). Obsidian from the Aeolian island of Lipari was favoured (Figure 2.13), although studies have shown that the Lipari obsidian trade decreased during the late Neolithic Diana period (Robb and Farr 2005). Recent analysis of the flint assemblage from Ta' Ħaġrat temple suggests the import of non-local flint may have increased to fill this gap (Vella 2009). As such, while some aspects of trade declined, the Maltese islands were not isolated from wider Mediterranean networks.

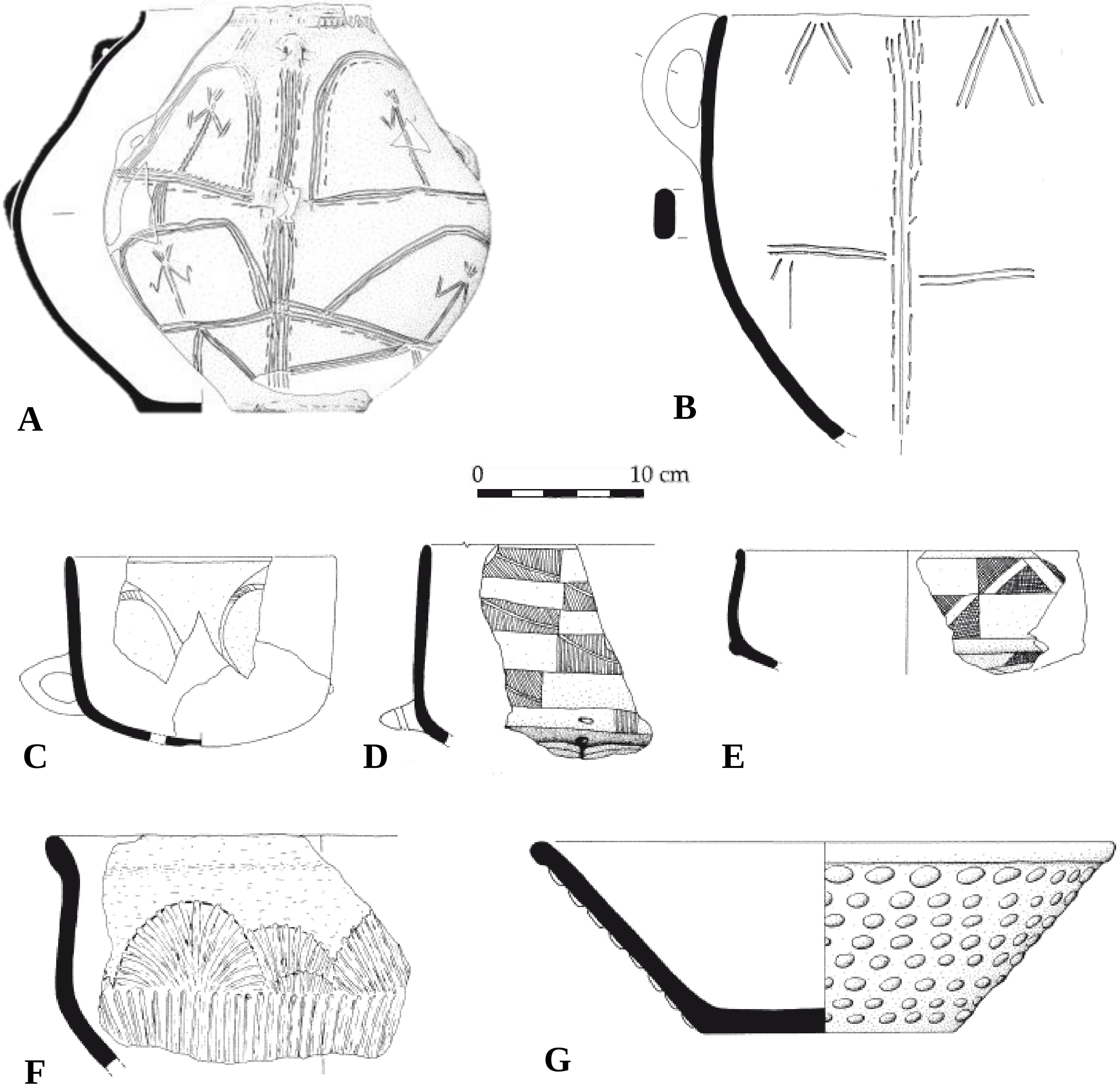


Figure 2.12: Pottery from the Xagħra Circle, Żebbuġ (A-B), Ġgantija (C-E) and Tarxien (F-G) phases (adapted from Malone, Bonanno *et al.* 2009, 220, 222, 227, 234, 235). Reproduced with the permission of Anthony Bonanno.

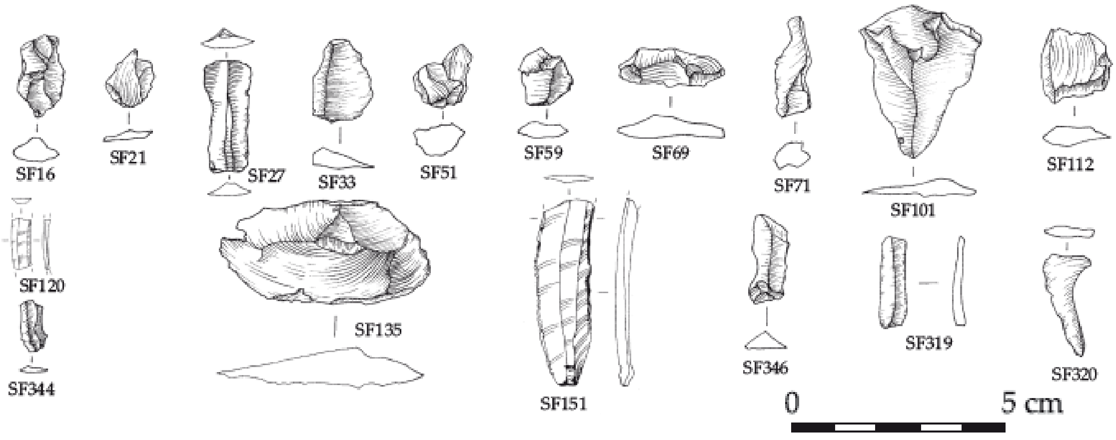


Figure 2.13: Selection of obsidian blades from the Xaghra Circle (adapted from Malone, Bonanno et al. 2009, 251. Drawn by Steven Ashley, Caroline Malone and Ben Plumridge). Reproduced with the permission of Anthony Bonanno.

2.3 Dying in Neolithic Malta

Only two early Neolithic sites contain human remains. In each case, they are associated with settlement evidence, suggesting an association between the living and the dead, which is particularly evident further afield on mainland Italy (Robb 2007b). At Għar Dalam cave, a metacarpal was found in early Neolithic occupation levels (Zammit 1912, 143) and later excavations identified small bones and cranial fragments alongside zoomorphic figures, a greenstone axe blade and other objects (Despott 1917, 1918, 1923). Small bone fragments were recovered from Skorba (Trump 1966b, 2015), with finds from the Għar Dalam hut attributed to two nonadults and one young adult[6] (Mangion 1966a). In layer EF5 were six small cranial fragments representing a young adult (Mangion 1966b). The deposition of small, disarticulated fragments of only a few elements within domestic spaces demonstrates secondary deposition and indicates that much of the population were deposited or disposed of in other ways.

The more considerable late Neolithic evidence, discussed below, demonstrates great variation in funerary practices (Figure 2.14). The earliest use of rock-cut tombs is dated to the Żebbuġ phase, with relatively small numbers of individuals placed in each tomb, comparable to Copper Age tombs in southern Italy and Sicily (Anzidei *et al.* 2007, 2011; Leighton 1999). This tradition continued into the Tarxien and, consistent with the elaboration of ritual architecture during the Ġgantija phase, burial architecture also expanded, with the construction of large interconnecting cave systems, known as hypogea. Few comparanda for the Maltese hypogea exist, although the Sicilian *domus de janas*, consisting of carved chambers organised around a central corridor, come close (Giannitrapani 1997; Leighton 1999, 93–99). In Malta, progressively larger numbers of the dead were deposited throughout the late Neolithic, peaking during the Tarxien phase, when the majority of depositions at the Xagħra Circle were made (Malone *et al.* 2019).

During the Żebbuġ and Ġgantija phases burial deposits were heavily ochred, staining skeletal remains with a pink hue (see Zammit 1928, 481). Megalithic slabs were sometimes used to pave the floor of tombs, or to cover skeletal remains. At all burial sites, material culture was deposited, but rarely seems to be associated with specific individuals. Where individuals were recovered in articulation, they are occasionally described as crouched, representing a flexed or contracted position (Tagliaferro 1911, 149; Zammit 1925a, 36), and there is extensive evidence for the rearrangement and redistribution of skeletal remains.

[6] One child of around 6.5–7.5 years of age is represented by a left maxilla fragment, and at least one child of 3.5–4.5 years old is represented by two mandible fragments (Mangion 1966a).

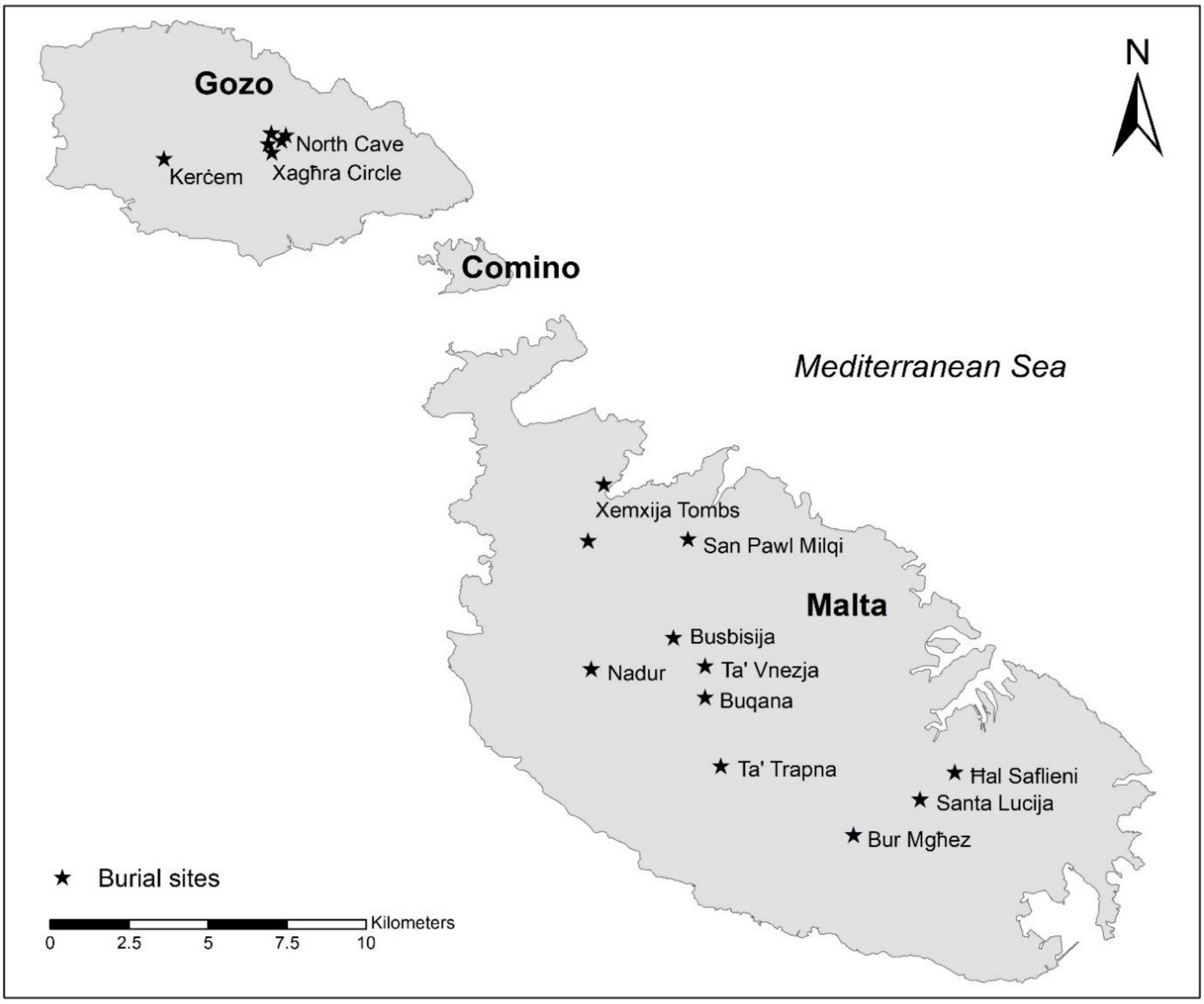


Figure 2.14: Location of late Neolithic burial sites, with sites discussed in text labelled.

Interpreting depositional practices at many sites is challenging due to their antiquarian excavation. The early 20th century represented a turning point in the discovery of large numbers of the prehistoric dead. Prior to this, all tombs excavated on Malta had proved to be Punic or Phoenician in date. After the excavation of Ħal Saflieni by Father Magri in 1901, the discovery of Buqana tomb and the Bur Mgħez cave in the early 1910s proved the existence of other forms of Neolithic burial sites (Tagliaferro 1912, Zammit 1928). Unfortunately, skeletal remains were often dismissed and the context and distribution of human remains from early excavations is generally not described (although Tagliaferro (1912) provides a good analysis of Bur Mgħez).

The corpus of burial sites is discussed chronologically below, according to the main three phases of the late Neolithic (Table 2.2). Although many have only been dated according to ceramic typology, this approach emphasises the development of burial architecture and elaboration of depositional practices from the late 5th to late 3rd millennium BC.

Site	Location	Region	Site Type	Phase	MNI	Depositional modes	References
Ta’ Trapna iz-Żgħira (Żebbuġ tombs)	Malta	Żebbuġ	Rock-cut tombs (5)	Żebbuġ	≥12	P, R?	Baldacchino and Evans 1954; Evans 1971, 166–169
San Pawl Milqi	Malta	Burmarrad	Rock-cut tombs (4)	Żebbuġ	≥4	P, SD?	Cagiano de Azevedo 1969
Near Ta' Kola Windmill	Gozo	Xagħra	Rock-cut tomb?	Żebbuġ	Unknown	Unknown	
Xagħra rock-cut Tomb	Gozo	Xagħra	Rock-cut tomb	Ġgantija	≥4	Probable P, R	Evans 1971, 190; Zammit 1928
Buqana	Malta	Attard	Rock-cut tomb	Żebbuġ–Ġgantija	≥3	Probable P, R	Evans 1971, 6; Zammit 1912, 1928
Bur Mgħez	Malta	Mqabba	Natural cave	Ġgantija–Tarxien Cemetery	45–100	P, R, SD	Evans 1971, 40; Tagliaferro 1911, 1912; Zammit 1925b
Xemxija rock-cut tombs	Malta	St Paul's Bay	Rock-cut tombs (7)	Ġgantija–Tarxien	112	P, R, SD?	Evans 1971, 112–116; Pike 1971b, 1971a
North Cave	Gozo	Xagħra	Rock-cut tombs	Ġgantija	Unknown	Unknown	Evans 1971, 183
Nadur	Malta	Rabat	Rock-cut tomb	Ġgantija	Unknown	Unknown	Evans 1971, 108; Zammit 1928, 483
Ta' Vnezja	Malta	Mosta	Rock-cut tomb	Late Neolithic	2	P	Evans 1971, 28
Bubisija	Malta	Mdina	Rock-cut tomb	Ġgantija	≥5	Unknown	Evans 1971, 28

Table 2.2: Late Neolithic burial sites. Abbreviations: PD (primary deposition), R (reduction), SD (secondary deposition).

Site	**Location**	**Region**	**Site Type**	**Phase**	**MNI**	**Depositional modes**	**References**
Parisot Street Tombs	Gozo	Xagħra	Rock-cut tomb?	Late Neolithic	Unknown	Unknown	
Għajn Melel Street Tomb	Gozo	Żebbuġ	Tomb and settlement	Late Neolithic	Unknown	Unknown	
Qala Hill	Malta	Qala	Rock-cut tomb?	Late Neolithic	Unknown	Unknown	
Ħal Saflieni	Malta	Paola	Hypogeum	Żebbuġ – Tarxien	"ca. 7000"	Probable P, R and SD	Dukinfield Astley 1914; Mifsud and Mifsud 1999; Pace 2000, 2004; Tagliaferro 1910; Zammit 1925a
Santa Luċija	Malta	Santa Luċija	Hypogeum	Late Neolithic	Unknown	Unknown	Magro Conti 1997; Skeates 2010, 224–225
Xagħra Circle rock-cut tomb	Gozo	Xagħra	Rock-cut tomb	Ġgantija	65 (11 non-adults)	P, R	Malone *et al.* 1995; Malone, Stoddart, Trump, *et al.* 2009
Xagħra Circle	Gozo	Xagħra	Hypogeum	Żebbuġ–Tarxien Cemetery	361–822	P, R, SD	Malone *et al.* 2009
Kerċem	Gozo	Kerċem	Rock-cut tombs	Tarxien	Unknown	P, R	Bernardette Mercieca-Spiteri pers. comm.; Times of Malta 2009

Table 2.2 (continued): Late Neolithic burial sites. Abbreviations: P (Primary deposition); R (reduction); SD (secondary deposition).

2.3.1 Żebbuġ burial sites

The Żebbuġ period characterises the earliest evidence for primary interment. The type site for the Żebbuġ ceramic tradition, a series of rock-cut tombs in Ta' Trapna iz-Żgħira in central Malta, comprises 5 cavities in the Middle Globigerina limestone (Figure 2.15; Baldacchino and Evans 1954). The tombs are small, averaging 1.8 m in diameter, with a depth of only 0.6 m. Fragmentary human remains were embedded in marl above a paved floor of chipped slabs (Evans 1971, 166–9). Tomb 1 contained the largest deposit, of at least seven individuals (two young adults, and five older adults). Whether this corresponds to a longer duration of use of this tomb is unknown. Tombs 2 and 4 were each said to contain two individuals, but the remains in Tomb 3 were too fragmentary to analyse. Within Tomb 5, a single adult was found alongside a statue menhir carved in a stylistic representation of a human head (Figure 2.16).

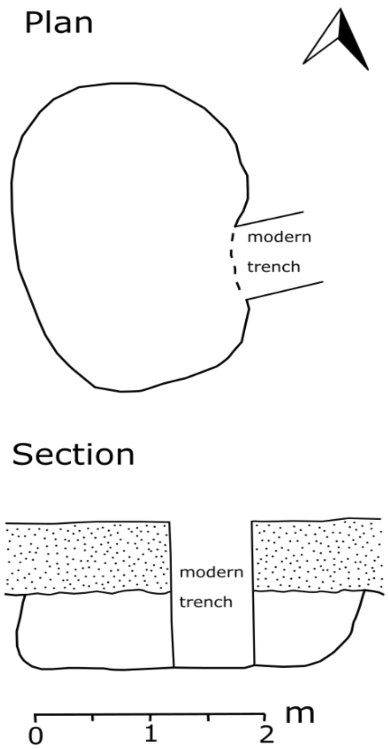


Figure 2.15: Plan and section of Tomb 5 at Ta' Trapna iz-Zgħira (redrawn from Evans 1971).

Figure 2.16: Anthropomorphic menhir fragment from Tomb 5 at Ta' Trapna iz-Zgħira, limestone with ochre staining (Vella Gregory and Cilia 2005, 32) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

At San Pawl Milqi, in north-eastern Malta, three tombs were excavated (Cagiano de Azevedo 1969). At least one (Tomb 4) is said to be Żebbuġ in date, containing a biconical vase, while the other tombs were devoid of material culture. Within Tomb 1, one complete skeleton was found on its left side in a flexed position, placed on top of a layer of shingles, with a lump of red ochre next to the cranium. At least two other crania were visible, but unexcavated, and relate to further postcranial remains which were embedded in the rock. No skeletal remains are described for Tomb 3, and only cranial fragments were encountered in Tomb 4. At Buqana in central Malta, a bell-shaped tomb with a relatively small diameter of 1.5 m contained a 10 cm deep ochred deposit of human remains, partially disturbed by later re-use (Evans 1971, 6; Zammit 1928). Three mandibles provide the MNI and were associated with sherds of at least 12 vessels (Zammit 1912).

On Gozo, there is a concentration of Żebbuġ activity on the Xagħra plateau. Outside of the Xagħra Circle, a single rock-cut tomb was found by a farmer in the early 1900s. Zammit (1928, 481) records that it comprised a circular chamber with a domed roof, 1.73 m in diameter, the entrance to which was sealed with a slab. Individuals had been placed on a base of stone slabs within the chamber, but its contents had been removed by the farmer. The fragmentary human remains and sediment were heavily ochre-stained and four pots were identified (Evans 1971, 190). One nearly complete skull[7] was recovered, with four mandibles providing the MNI.

At Ħal Saflieni, initial occupation is indicated by surface-level finds of Żebbuġ pottery, perhaps contemporary with monumentalisation of the upper level, but the housing development directly overlying the hypogeum has unfortunately destroyed further remains (Pace 2000). There does not seem to be any evidence of burial or deposition from this period within the hypogeum. Compared to the intensive scale of deposition in the hypogea, the rock-cut tombs of this early phase are thought to represent burial of small familial or kin groups (Malone and Stoddart 2009, 363). Based on the scant evidence, primary interment, followed by successive deposition and reduction of the skeletal remains, seem to have been the most common funerary practices.

2.3.2 Ġgantija burial sites

During the succeeding Ġgantija phase, burial architecture remained similar although a preference for larger spaces and a diversification of sites becomes clear. Many rock-cut tombs were poorly preserved, and the best available evidence is from Bur Mgħez cave and the Xemxija rock-cut tombs.

A group of sites in central Malta, all poorly preserved and dated, are broadly consistent with this period. Busbisija, the northernmost, represents a single tomb, the roof of which was already destroyed when excavated (Evans 1971, 28). The chamber contained the remains of 5 individuals, although there is no information on their condition or distribution. To the south, the Ta' Vnezja tomb was in worse condition, with only the very base of the deposit preserved (*ibid.*). The fragile remains of an adult and child were covered in ochre and fragments of pottery,

[7] Although reported as a skull, this may refer only to a cranium since mandibles were recorded separately.

ochre, and a shell bead were also found. At the westernmost edge of this tomb group is Nadur, a kidney-shaped tomb with a domed chamber (Figure 2.17; Evans 1971, 108). There is no information regarding the human remains, although it is noted that they were deposited in a layer of red earth alongside Ġgantija pottery sherds (Zammit 1928, 483).

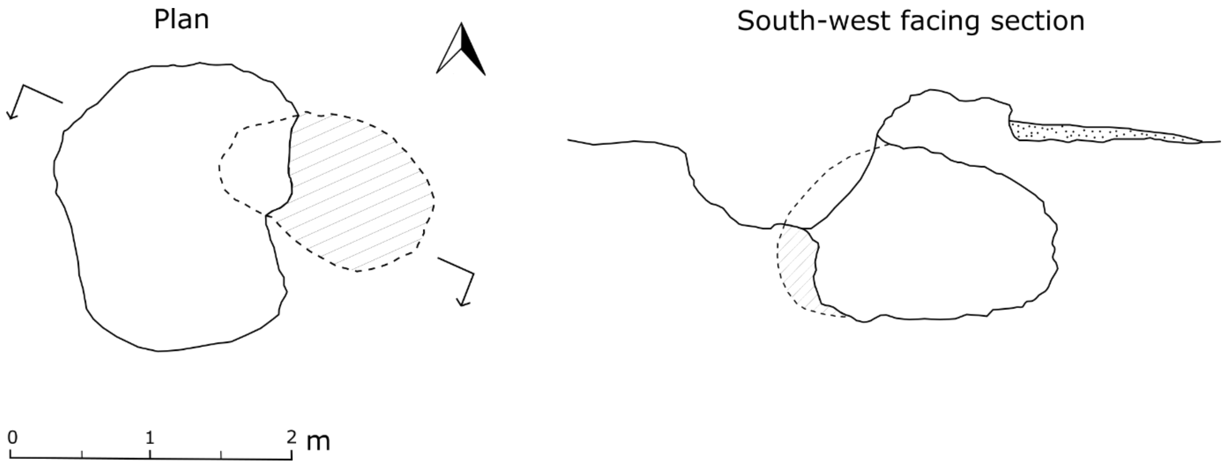


Figure 2.17: Plan and section of Nadur tomb (redrawn from Evans 1971).

Human remains from the Bur Mgħez cave in southwest Malta were better preserved (Figure 2.18; Tagliaferro 1911, 1912). A single radiocarbon date indicates Ġgantija to Tarxien use of the site, from 3150–2650 cal BC (Malone *et al.* 2009, 342). The cave extended for at least 15 m, with the burial deposits concentrated in the first section (Evans 1971, 40; Tagliaferro 1911). Skeletal remains were found in various states: articulated flexed primary inhumations, disarticulated remains, and caches of crania and long bones. Bones were excavated from an ochred matrix associated with Globigerina pebbles, stones and megalithic slabs, in many cases used to cover the remains. Articulated skeletons were positioned on their left side, facing east. Human remains were commingled with faunal remains and material culture, including potsherds, flint and shells. Tagliaferro's initial excavation was expanded by Zammit (1925b) who found an intact deposit of commingled human remains in an ochred layer under a stone platform. Estimates vary for the number of individuals deposited: Tagliaferro recorded 35 skulls, although Evans quotes 39, and a further six were excavated by Zammit. Zammit's excavation recovered 2,250 teeth, leading to his estimation of 70 individuals, though this figure does not account for the remains from the earlier excavation. Although it is unclear whether the site was fully excavated, it is evident that a much larger number of individuals were deposited in this cave than in contemporary rock-cut tombs.

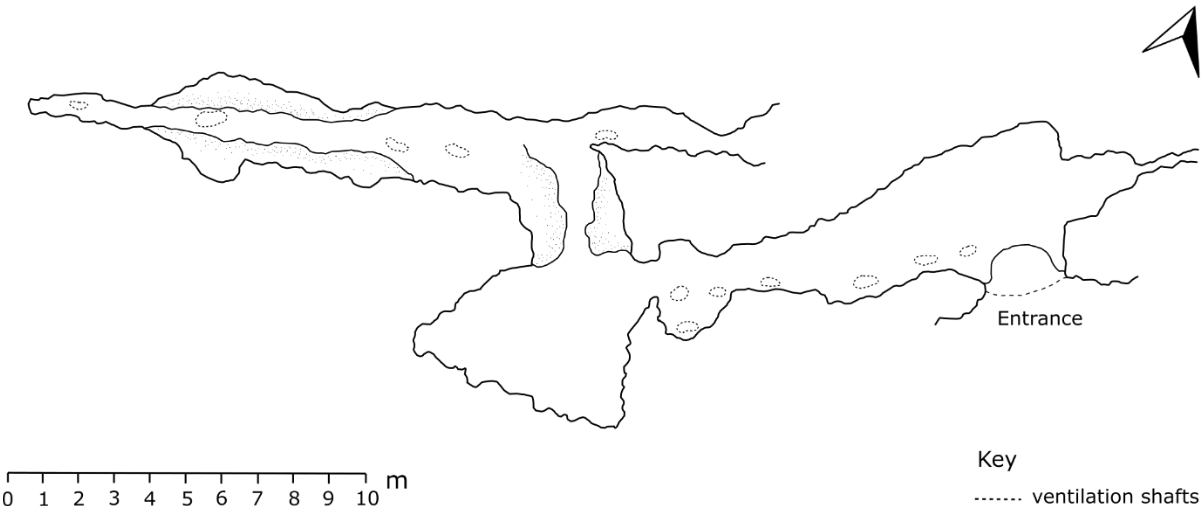


Figure 2.18: Bur Mgħez Cave (redrawn after Evans 1971).

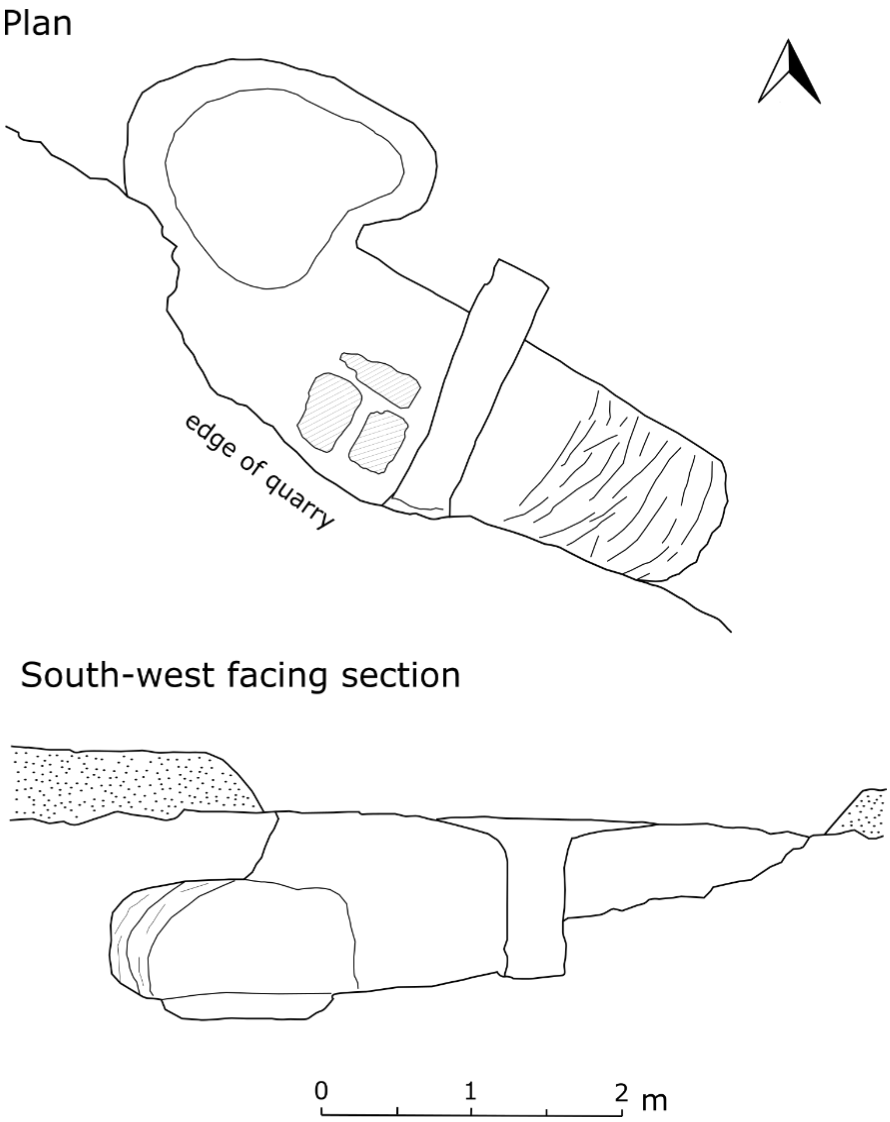


Figure 2.19: Plan and section of the North Cave (redrawn from Evans 1971).

The seven rock-cut tombs at Xemxija, located on high ground near the coast in northern Malta, represent a larger scale of deposition than other rock-cut tombs. Unfortunately, however, there is no description of the context or condition of the human remains as found *in situ*, nor was any attempt made to estimate the total burial population (see Chapter 4). Further Ġgantija period tombs are noted on Gozo, close to the Ġgantija monuments in Xagħra. The North Cave (Figure 2.19), located about 54 m north of the Ġgantija 'temples', was an ovoid shaped tomb preceded by a 2.9 m long entrance ramp; the tomb and ramp were filled with ochre-stained earth and stones and, alongside much Ġgantija and Tarxien pottery, stone tools and faunal bones, were found human cranial fragments and teeth (Evans 1971, 183).

The first burial deposits at Ħal Saflieni were likely made during this period. The Upper Level (Figure 2.20), accessed through a ramp from the surface level of the monument, was hollowed out; the space mainly consists of a central 'lobby', to the right and left of which a number of chambers were cut into the side walls (Pace 2004, 25). Zammit (1925a, 36) reported that one of the chambers to the right of the entrance contained a complete, articulated skeleton of a male adult in ochred soil. In the first chamber on the left (Figure 2.20, 4) the remains of an original burial deposit were left *in situ* by Zammit. Most of the human remains were originally excavated from here, with elements said to represent at least 120 individuals (Zammit 1925a, 53), leading to the estimation that several thousand individuals were originally deposited in the hypogeum. Recent excavations (1990–1993) as part of conservation works, have identified further intact deposits in the Upper Level, including articulated human remains (Cutajar 2001).

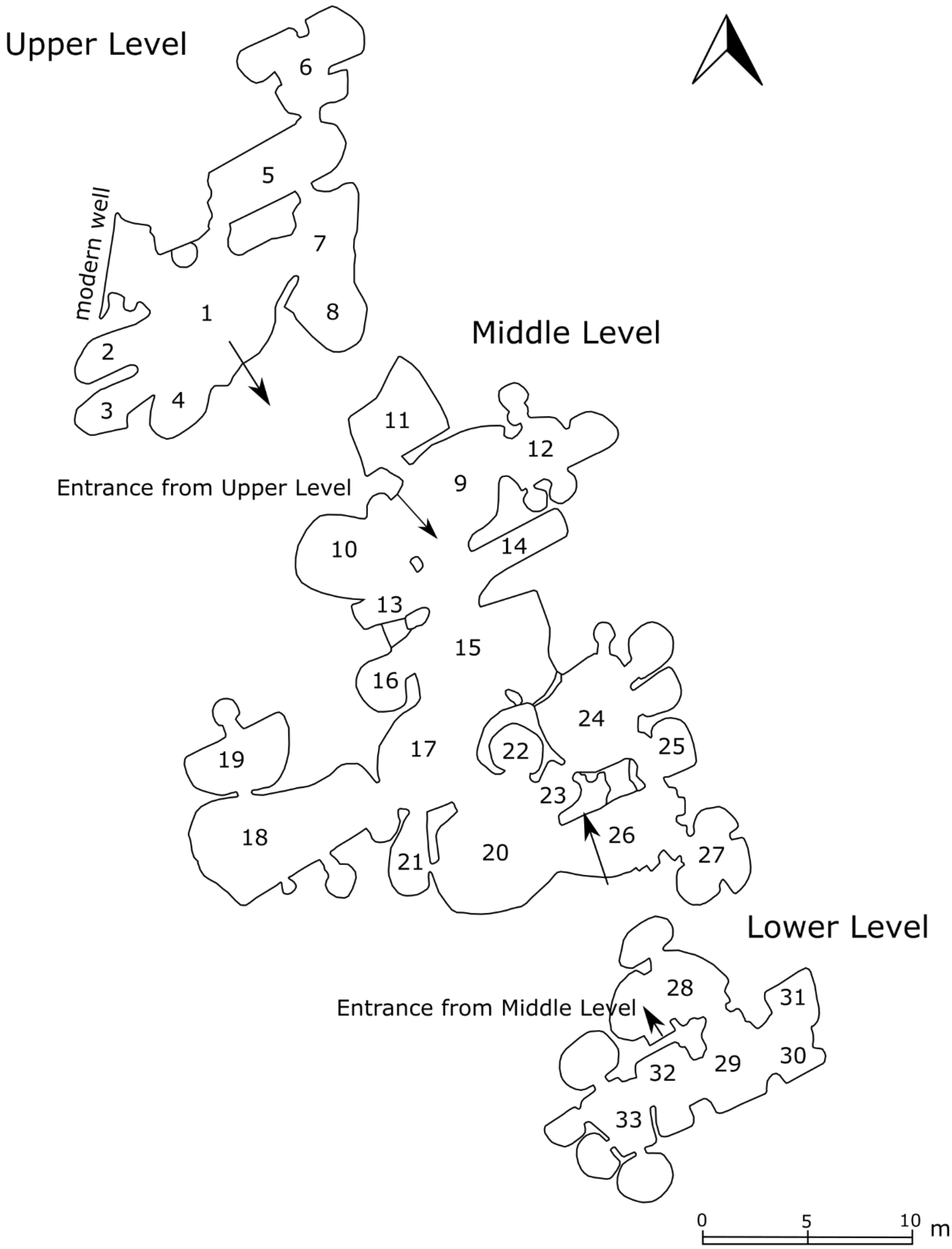


Figure 2.20: Plan of the Middle and Upper Levels of Hal Saflieni (redrawn from Grima 2016b).

At the Xagħra Circle, two rock-cut tomb chambers joined by a central shaft, at the south-eastern edge of the site, date to the Ġgantija phase (Malone *et al.* 1995). These tombs were densely filled, containing a larger-than-average number of individuals. As at the Żebbuġ tombs, a carved menhir was deposited in one of the chambers and the deposit was heavily ochred. The

West chamber was reopened to place a single inhumation below the entrance, representing some of the only articulated remains found within.

As this summary has shown, alongside the long-term tradition of rock-cut tombs, much larger spaces began to be used in the Ġgantija phase. At Bur Mgħez, the natural cave was likely enlarged, and multiple chambers were cut into the limestone at Ħal Saflieni, each larger than a single rock-cut tomb. This may indicate that multiple groups were uniting in the performance of communal funerary rites. Moreover, deposition took various forms. Primary interment is demonstrated at Ta' Vnezja, Ħal Saflieni, the Xagħra Circle and Bur Mgħez, and suggested at Xemxija, while manipulation and redistribution of remains is evident from their commingled and disarticulated character.

2.3.3 Tarxien burial sites

The Tarxien phase represented significant expansion at both Ħal Saflieni and the Xagħra Circle. These appear to be the only burial sites with use, albeit sporadically, from the Żebbuġ through to the Tarxien phases. There is at least one other hypogeum on Malta, at Santa Luċija (Paola) (Skeates 2010, 224–225), but although the site was excavated in the 1970s, no report on the monument or human remains exists, except for a short notice describing a megalithic trilithon (Magro Conti 1997).

The earliest excavations at Ħal Saflieni cleared deposits in the Middle and Lower Levels which likely dated to this phase. Deposition in the chambers on these levels is indicated through soil marks on the limestone walls, but any human remains were discarded during excavation (Pace 2004, 26).[8] The Middle Level is reached by a corridor-like chamber which looks through to the main chamber and 'holy of holies'[9] (Figure 2.20, 26). Each side of this corridor are small chambers with preserved checkerboard and spiral ochre ceiling and wall paintings; on the left side is a 7 ft deep pit which contained numerous artefacts, including the famous 'sleeping lady' figurine. The Lower Level is reached by a series of steps in front of the 'holy of holies' (Pace 2000, 7). The last step is raised 2 m above the ground level, and thin walls extending only to 2 m height separate many of the chambers, suggesting a deep soil deposit (Pace 2004, 41). Given this depth, natural light would have been scarce and artificial lighting necessary (Zammit 1925a). The hypogeum was excavated following fault lines, leading Grima (2016b) to suggest that its construction was itself a journey of exploration, symbolically redolent of death.

[8] There are only five remaining crania from the original deposit, although photographs from 1912 depict 12 crania (Mifsud and Mifsud 1999, 154).
[9] The 'holy of holies' is the most well-known feature of the hypogeum; here, 'temple' architecture was imitated through carvings in the limestone which recreate a trilithon arrangement of orthostats and corbelled roofing.

On the Xagħra plateau, the harder Upper Coralline limestone prevented the carving of architectural features as at Ħal Saflieni. The construction of the outer megalithic circle at the Xagħra hypogeum may relate to the Tarxien phase, and the burial evidence tells of a much larger scale of deposition and funerary ritual during this period (see Chapter 4).

In 2008, the only known Tarxien phase rock-cut tombs were excavated at Kerċem on Gozo (Figure 2.21; Times of Malta 2009). The structure represents a pair of rock-cut tombs with one enlarged chamber, perhaps originally joined by a central shaft. Human remains from the main chamber were destroyed during building works and are represented by disarticulated fragments lacking contextual information (Bernardette Mercieca-Spiteri pers. comm.). The enlarged section of the smaller chamber was carefully excavated and recorded, revealing the primary inhumation of three articulated individuals, with a platform of slabs placed between each. At the lowest level was a flexed individual on their right side, with their head to the east and facing the tomb wall. In the middle level was an individual on their left side, with their head to the west, facing the tomb wall. Remains in the upper level were less complete, but a skull and elements of the axial skeleton indicate primary deposition, and another skull was excavated adjacent to this. Disarticulated remains were present in each layer, often at the back of the chamber, representing the clearance of previous deposits.

Photo of Kerċem tomb removed for copyright reasons. Copyright holder is Times of Malta, available online at https://timesofmalta.com/articles/view/5000-year-old-tombs-found-at-kercem.276763

Figure 2.21: Kerċem tomb under excavation (© Times of Malta 2009).

Throughout the late Neolithic, funerary practices diversified, with increasingly varied depositional practices attested in the Tarxien. Current evidence suggests fewer burial sites were in use in the later phases, with some earlier sites continuing to be revisited.

2.4 Current approaches to burial in Neolithic Malta

Discussion of Neolithic burial sites in Malta has most often focussed on their origins, development, landscape position, and the form and symbolism of mortuary rites (Skeates 2010, 216). Processualist and early post-processualist approaches have particularly shaped discourse on the relationship between funerary rites and social structure in late Neolithic Malta. In particular, the notion of burials as an arena which represent aspects of social identity, especially status (see Binford 1971; Saxe 1970; Tainter 1978). However, as the burial process represents a negotiation on the part of the community, identities may be transformed or subverted (e.g. Parker Pearson 1982, Shanks and Tilley 1982). In the case of Neolithic Malta, it has been argued that collective deposition naturalised social hierarchy through ideologically emphasising corporate identity (Skeates 2010; Stoddart and Malone 2015). Forms of funerary treatment have been assigned prestige; against a background mass of disarticulated community members, articulated foundational inhumations of adult males (Malone and Stoddart 2009, 366) have been identified as significant ancestors or 'ritual elites' (Bonanno 1996; Stoddart and Malone 2008).

However, inferring social status and conceptions of individuality through funerary treatment arises from an outdated and simplistic model of personhood. Both power and personhood emerge through relations and may be produced differently according to context (e.g. Foucault 1970; Fowler 2016). While burials unquestionably provide the opportunity to renegotiate the identity of the deceased, they also reveal only one sphere through which social personae and personhood are produced. Moreover, the processes the dead undergo—the sequence of actions through which the body is transitioned from a corpse to a socially dead being—are especially important for considering *how* the dead are transformed, and how different aspects of individuals' personhood may affect their treatment (Fowler 2013; Robb 2013). The potential for the dead to affect the living is overlooked when the final stage of mortuary rites is given precedence. Current approaches therefore struggle to articulate the multiplicity of funerary practices, and the relationship between lived bodies and the conception of bodies in death. Reconstructing post-mortem manipulations of the dead and placing these within their socio-cultural context allows for more holistic understandings of the body to be developed.

Recent work is beginning to challenge the dominant narrative, emphasising co-operation as a crucial means of offsetting economic risk in late 3rd millennium BC Malta (Cazzella and Recchia 2015; Malone *et al.* 2019; McLaughlin *et al.* 2018). Yet, the role of collective and prolonged funerary practices within this more heterarchical vision of society remains to be addressed, a problem I return to in Chapter 9. In addition to their social resilience, the physical resilience of the population is clear, with increased palaeopathological evidence for stress and trauma in the late Tarxien period (Power *et al.* forthcoming; Stoddart, Barber, *et al.* 2009). Lived experiences of occupying this marginal environment shaped bodies and, by extension, body worlds. The role of funerary practices, to engage with the past and maintain relationships with the dead, takes on greater significance in this context. This research therefore asks how depositing and revisiting the dead shaped identity, by examining the relationship between funerary practices and bodily habitus.

As the ethnographic literature demonstrates, death is a part of life. Funerary rites are closely related to cultural beliefs about the body, the reproduction of society, local ontologies and worldview (Bloch and Parry 1982; Huntington and Metcalf 1979). Ethnographic and ethnohistoric accounts of collective deposition in non-Western cultures consistently illustrate how these rites actively maintain relationships with place and community, in ways that differ locally (e.g. Bloch 1982; Creese 2015; Lau 2015; Seeman 2011). In the following chapter, it is argued that mortuary rites comprise one arena in which bodily ontologies were shaped. Major works on personhood in Neolithic Europe are summarised, demonstrating how burials can be explored more holistically. To provide greater insights into the construction of personhood in 4^{th}–3^{rd} millennium BC Malta, the crafting and treatment of anthropomorphic figurines is examined. Finally, moving beyond models of burials as producing static and fixed individual identity at death, it is shown that collective and secondary funerary practices continue to negotiate personhood in death through prolonging the social process of dying. Establishing deathways in late Neolithic Malta allows the embodied performance of mortuary rites to be addressed, asking how they responded to lived identity and worked to produce new understandings of personhood.

CHAPTER THREE

DEATH AND THE BODY

'…the battered angels in the graveyard that kept watch over their battered charges held open the doors between worlds (illegally, just a crack), so that the souls of the present and the departed could mingle, like guests at the same party. It made life less determinate and death less conclusive.'
—Arundhati Roy, 'The Ministry of Utmost Happiness' (2017, 398).

3.1 Beyond death

This chapter explores how death is shaped through actions involving the dead body which draw on conceptions of the body during life. These actions both ensure the transition of the dead person from the realm of the living and reformulate them into a different type of being. As these processes relate to the body—to personhood, cultural ideals, and physical changes the body undergoes at death—archaeologies of the body must be considered alongside approaches to death and dying. In particular, the concept of 'body worlds' (Harris and Robb 2013a) is useful for exploring the ways both bodies and personhood emerge from historically-situated practices and relationships. Body worlds in three different areas of Neolithic Europe are illustrated, leading into a discussion of how the body is presented through Neolithic Maltese figurines. The ways that gender and age intersect with personhood are outlined, presenting current understandings of gender and ageing in Neolithic Europe.

Until recently, the archaeological literature has treated death as a static biological event, and the dead as passive entities whose identity is constructed and manipulated by the living. This arguably reflects too closely our own (Western) experiences of death, which tie it to a medical context and very quickly seek to separate relatives from deceased loved ones. This cultural expectation has affected archaeological and osteological practice. As Robb (2013, 443) perceptively notes, paralleling the transformation the dead undergo during funerary practices, "our material processing of archaeological bodies creates a recategorization of the dead". The remains of the dead are arguably objectified and dehumanised through our practices; when we wash, sort, and store human remains, and transform them into database entries and laboratory codes (Leighton 2010; Tradii 2016). Such objectification can be overcome, however, by approaching death as a social process, and taking seriously the position held by many other cultures—that the dead *can* be social agents and represent a powerful resource for the living.

As Anjum, the protagonist in Roy's (2017) *The Ministry of Utmost Happiness*, teaches us, social relations with the dead can be maintained through connection with their burial place, their physical remains, or their belongings. Regardless of how the dead are conceived, and whether belief in a soul is held or not, they frequently live on in the imagination. In this respect, the dead do something more than simply dying. Focussing on the relationship between lived and dead bodies and the temporality of engagements with the dead, the integrated approach to funerary practices and identity put forward in this chapter contributes to a more holistic account of the body in Neolithic Malta.

3.2 Bodies and their parts

If we are to centre bodies in discourse on funerary practices, we must first examine what the body *is*. The immediate temptation is to reduce the body to a biological reality. We are all fleshy beings—the stuff of bone, muscle, skin, blood, organs, hair, nails—and in many ways this may be the only commonality between bodies across the world. But our very corporeality betrays the unstable and surprising nature of bodies. Brief periods of physical labour change our bodies in a sadly all-too-impermanent way (and here I'm sadly pondering my own withering biceps after a summer of digging!), no matter how hard we try, the wrinkles and grey hairs cannot be kept at bay, and parts of our bodies might deteriorate and fail us even though we appear to be entirely healthy. But biology does not determine bodies. True, age, sex, ethnicity, and physical proficiency all have a bearing on the ways that bodies are socially integrated. In the end, though, our bodies are made sense of through a bewildering array of social, cultural, political and historical systems.

In their attempts to review bodies in literature spanning anthropology, gender studies and sociology, numerous authors have recognised the difficulty of pinning the body down (e.g. Butler 1993; Grosz 1995; Haraway 1991; Shilling 2003; Van Wolputte 2004). Bodies operate in diverse spheres, changing too fast to be apprehended and captured meaningfully. Indeed, wherever you are in the world, bodies appear different (Harris and Robb 2013b). More than that, they *are* different. The body, among the Ojibwa, is akin to clothing; it is merely a surface form which covers the essential vitality, or soul, of persons (Hallowell 1960; Ingold 2000, 100). Ojibwa persons can therefore take many forms, from humans to animals, and even natural phenomena such as the sun and thunder. In each of their given geographic, cultural and historical contexts, bodies are the node from which social relations unfold and are given meaning (Harris and Robb 2013b, 3). Their situatedness is encapsulated in the concept of 'body worlds', or "the worlds all of us inhabit all the time", which shape culturally-specific ways of being bodily (Harris and Robb 2013b, 3).

Bodies are both biological and social, individual and cultural phenomena, produced through specific contexts which structure appropriate ways of acting (Bourdieu 1977; Butler

1993, 1999; Connerton 1989; Mauss 1973). As Bourdieu (1977, 116) states, “technical or ritual practices are determined by the material conditions of existence”. The texture of the world our bodies inhabit—landscapes, buildings, furniture, transport, houses, crowds—all demand different ways of moving and acting. We know how to navigate these spaces through habitus, but these spaces also produce and mark out different bodies, generating different forms of identity. In this way, ontologies are not pre-existent and given, “they are brought into being” through social and material practices (Mol 2002, 6). These practices produce multiple versions of the body across different fields of action, and these diverse bodies structure beliefs which also leave their mark on the treatment of the dead.

In their formulation of ‘body worlds’ Harris and Robb (2013a) draw on habitus to articulate the dialectic between action and society (Figure 3.1). Abstract structures, such as class, gender and age (Bourdieu’s *doxa)* are produced by specific gestures and ways of acting across multiple fields of action; similarly, a single field of action can serve as a site for reproducing multiple structures (Harris and Robb 2013a, 21). An action as simple as boarding public transport can serve to reinforce categories such as age and physical ability. These practices involve direct actions which shape understandings of the body, and are described as practical ontologies (*ibid.,* 15). Practical ontologies work reciprocally, producing bodies and their worlds: bodies which are *in* and *for* their worlds.

A key part of placing bodies in their worlds, therefore, involves uncovering how certain practices produce or emphasise different aspects of bodies, which may not be disclosed in other spheres of social or material relations (Harris and Robb 2012; Mol 2002). To take the example we worked with earlier, Ojibwa persons may change bodily forms across categories of species, but this potential for transformation is only held by persons with great power (Hallowell 1960; Ingold 2000, 91). The multiplicity of bodies, or their capacity to operate multimodally, is evident through the opposing ideas about the body that are held by all cultures (e.g. LiPuma 1998; Mol 2002; Tarlow 2010; Viveiros de Castro 1998). Some of the roots of multimodality lay in the history of bodies; as older beliefs endure alongside new beliefs, multiple understandings of the body are interwoven through time (Harris and Robb 2013a, 22). Just as there are myriad ways to apprehend the world, there will always be multiple perspectives on the body and numerous ways to *be* bodily. Yet, while it is increasingly acknowledged that multiple bodies exist at any one point in time within a given culture, this has not strongly influenced thought on the treatment and construction of the dead. Graham (2015, 9) has suggested that there could “be multiple ways in which to be ‘dead’”, but this potential for post-mortem diversity and difference could be explored much more fully in narratives of deathways.

In the following discussion, we will break down the body to consider different models of personhood and explore how personhood has been employed to characterise bodies in Neolithic Europe. With much emphasis in both anthropological and archaeological discourse on partible and permeable persons, practices of fragmentation and disarticulation have been particularly influential in studies of material culture and funerary practices.

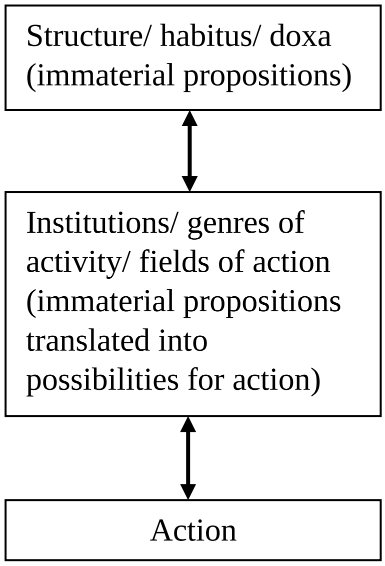


Figure 3.1: The relationship between action, fields of action and habitus (adapted from Harris and Robb 2013a, 21).

3.2.1 Body parts and partibility

When considering personhood and the composition of bodies, a distinction is frequently drawn between indivisible and divisible bodies, or individual and dividual forms of personhood. The vast array of practices involving the disarticulation, fragmentation and redistribution of the dead in prehistory has often been understood in relation to concepts of divisibility and dividuality. As has been noted (Brittain and Harris 2010; Jones 2005), this results in a generalised sense of relational personhood across the Neolithic but, problematically, personhood appears to have been actively sought out through analyses of these processes. A correlation between fragmentation and the enchainment of persons is often inferred, resulting in readings of personhood which are remarkably similar to Melanesian contexts, where parts of persons are exchanged through gift transactions (Brittain and Harris 2010).

In both Melanesia and India, persons are dividual and composed through the parts and substances of, and relations with, others (Busby 1997; Fowler 2004a, 25–31; Knauft 1989; Strathern 1988; Marriott 1976; Mosko 1992). Dividual personhood may operate through diverse mechanisms but, in each configuration, persons are continually shifting in their internal composition and can embody entities at multiple scales. These mechanisms include partibility, in which multiply-authored persons can alter their constitution through the exchange of objects which encapsulate parts of persons (Mosko 1992; Strathern 1988), and permeability, the means by which bodily substances flow between people to maintain relationships. In the latter system, relations may not be extracted but the quantity of particular substances may be changed (Busby 1997; Marriott 1976). These exchanges implicate gender, age and caste or religion. In Melanesia, the gender of exchange transactions may be ambiguous (Strathern 1988), but in India substances have fixed genders (Busby 1997).

Just as persons are comprised of multiple relations, so too are collective entities; during social gatherings and ceremonies, the bringing together of diverse individuals presents the social unit as a single dividual entity (Strathern 1988, 15). The mechanisms by which persons are composed is shared across scales such that both individuals and collectivities contain multiple relations (Fowler 2004a, 48–52). In this logic, singular and corporate entities are immanently inter- or multi-scalar, embodying what Wagner (1991) terms a fractal notion of personhood, or 'holography'. Specific individuals (such as 'big men' in highland New Guinea) may acquire the power to speak and act for the collective unit but they are neither wholly individual nor plural (Wagner 1991). A well-formulated argument of fractal personhood in the ethnohistoric record has been presented for the obsidian idol-deity Curicaueri from the prehispanic Mexican state of Tarasca (Haskell 2015). As each new town was conquered and settled, a flake of obsidian was installed from the core residing in the capital, signifying the simultaneous presence of the idol across the kingdom. The quality of the obsidian, and the range of discursive practices surrounding it, are argued to have enabled its fractality. All instantiations of the idol therefore took part in the movements of all others, affecting Tarascan understandings of time and space. In this context, fractality is indicated through textual and material practices, and is grounded in a system of religious and political control. However, when applied to prehistoric Europe, the notion of fractal personhood is often implied as a result of dividuality, without due consideration for its political implications.

Both the distinctions drawn between individual and dividual persons, and the conceptual leap from fragmentation to partibility are problematic. On the first count, all persons are composed by their relations in ways which differ depending upon time, context and scale. All cultures will therefore mark out individual and dividual facets of personhood through different spaces and relations (Fowler 2016; LiPuma 1998). It is therefore productive to ask in which *ways* relations are constructed, how they change over the life-course, and how they are formulated across different fields of action. Fowler (2016) suggests a series of terms for articulating personhood which go beyond traditional binary distinctions (Figure 3.2), including modes which may commonly be held in tension (such as bounded versus distributed personhood), alongside those which may complement each other (mutable and distributed, for example). In this formulation, personhood is multidimensional, complementing the concept of multimodal bodily ontologies, discussed above.

On the second count, Brittain and Harris (2010) have problematised in some depth the association drawn between fragmentation and dividual personhood and the explicit primacy given to object completeness in these narratives. They show how fragmentation may in fact pose an ontological dilemma in cultural contexts where the boundaries of the body are tightly controlled (for example, the significant efforts expended to identify body parts following mass disasters) and note how the anthropological literature frequently recognises relational personhood as achieved through the gifting of whole objects. Therefore, while fragmenting materials was clearly an important practice in specific times and places, it was not always about dividuality. Rather, it tells us something about material relations and properties. Instead of prioritising completeness (see Chapman and Gaydarska 2007), practices of breakage, reduction and disintegration instead suggest the importance of transformations and creating new possibilities for materials and their associated practices, contexts and relationships (Brittain and Harris 2010, 589).

Furthermore, as Fowler (2004a, Chapter 4) demonstrates through a review of mortuary practices among cultures with dividual conceptions of personhood, the relationship between personhood and the treatment of the dead is complex. It is not always the case that dividuals are fragmented after death (*ibid.*, 51), though when they are, disarticulation often relates to mourning and remembering the dead (Strathern 1981). As a potent substance, bone can retain aspects and essences of the person after death. Ongoing social and material practices, such as mortuary exchanges and feasts, are just as important to consider as the form of funerary practices themselves. However, as discussed, the social negotiation of the bodies of the dead is not unrelated to conceptions held of the body and personhood during life, but there is opportunity to transform and redirect the body in slightly new ways (Fowler 2004a, 44–45). As a framework for drawing together a perspective on bodies in late Neolithic Malta, several influential interpretations of the body and personhood in Neolithic Europe—which largely draw on the ideas discussed here—are presented below.

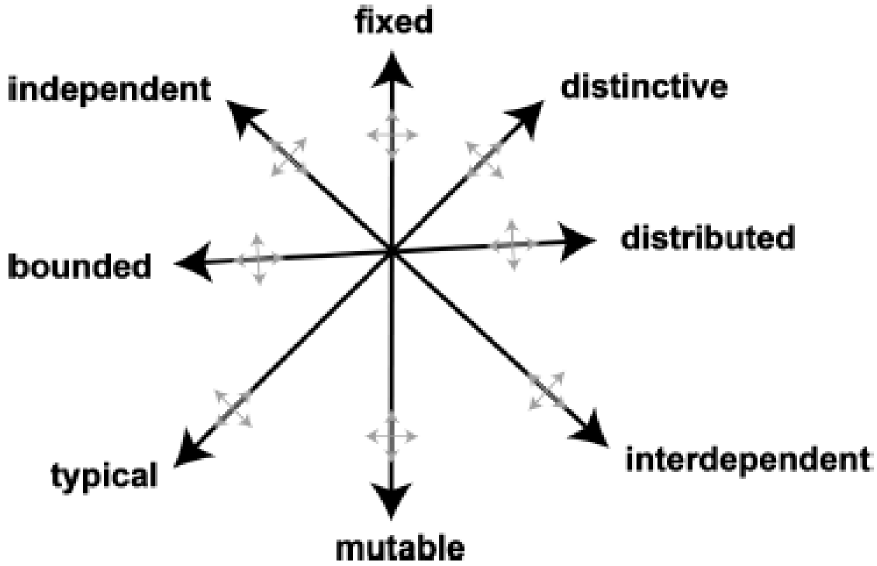


Figure 3.2: Axes of personhood, demonstrating the multiple dimensions which may be held in tension (opposed ends of an axis) or in operation. Modes of personhood may include, but are not limited to, those terms which illustrate this model. C. Fowler, 2016, 'Relational personhood revisited' in *Cambridge Archaeological Journal* 26(3), page 402, reproduced with permission.

3.2.2 Bodies in Neolithic Europe

Neolithic body worlds provided a radically different set of possibilities for constructing bodies and personhood than in earlier periods. With the gradual, large-scale adoption of agriculture, new ceramic technologies, and increased sedentism, relationships with time, people, landscapes, and animals all underwent transformations (Harris and Robb 2013a, 24; Whittle 1996). At the macro-scale, it has been suggested that personhood was less often conceived through relations with important places and animals, and more often through drawing links with ancestors (Borić *et al.* 2013). This may be one of the key reasons why we see the dead more frequently located in the landscape in enduring monuments and prominent positions. The body also comes into greater focus as a medium for expressing identity, and a site which was increasingly politically regulated. In particular, working with the materialities of clay and stone formulated new understandings of bodies, with metaphorical associations often drawn between clay and flesh, and stone and ancestral bodies (Borić *et al.* 2013; Parker Pearson and Ramilisonina 1998). At a micro-scale, however, contextual differences are apparent which are important for considering local social processes. For instance, houses or tells and single graves feature regularly in central and southeast Europe; sedentism is less consistent in northern Europe where megalithic architecture flourished; and the central Mediterranean is particularly fragmented with numerous distinct cultural practices across peninsular Italy. Analyses of personhood in each of these three areas will be considered in more detail.

In southeast Europe, the Neolithic was underway from the 7th millennium BC, across a large area encompassing many distinct traditions and apparent contradictions (with intramural burial in Balkan tells, and extramural burial elsewhere, for example; see Chapman and Gaydarska 2007). The widespread presence of anthropomorphic figurines reveals a preoccupation with the representation of the body and, in many cases, they appear to have been intentionally broken. Combined with the frequent disarticulation of skeletal remains, these practices have been argued as a deliberate strategy to reference complete entities while dispersing them and bringing them into new material relations (*ibid.*). The accumulation of both fragmented objects and body parts at Balkan tell sites has been argued to represent fractal personhood achieved through enchainment (Chapman 2000; Chapman and Gaydarska 2007). Although, on a broader scale, variable depositional practices at times referenced individuality (through complete interments), the dominant reading of fractals emphasises the place of all individuals within greater social collectivities. Furthermore, through a careful analysis of Balkan figurines, Bailey (2005, 2008) argues that they presented clear ideas about being human. The similarity and homogeneity in their design reveals a politics of the body concerned with limiting fluidity and flexibility; "tying down the human" emerged as an extension of sedentism and domestication in this context (Bailey 2005, 146). Similarly, he argues these cultural norms were effective for integrating individual persons into coherent and corporate social groups (Bailey 2005, 200).

Personhood in southern Britain and the Isle of Man during the early Neolithic (4100–3400 cal BC) is also traced predominantly along dividual lines, although monumental burial sites and diverse funerary practices characterised these regions. In particular, equivalences between vessels and bodies in these regions have been drawn out (e.g. Lucas 1996), as containers or mediators for substances which composed relations (Fowler 2008, 52). In the Isle of Man, Fowler (2004b, 2008) traces fractality through the metaphor of vessels, where ceramics and bodies (both permeable to flows of substances) were similarly fragmented, and contained within the vessel of the tomb, which may have stood for communal scale of the person. Tombs, like persons, were constructed through incorporating materials and relations from the landscape. Harris (2018) proposes a dual ontology of permeability and partibility in early Neolithic Southern Britain. He considers the movement of both humans and animals across the landscape as instructive of flows of people and substances, while the breaking down and recombination of the dead and material culture emphasised separation. Although, following the discussion above, it is perhaps best to consider these processes as operating together within a single, coherent ontology (following Fowler 2016) rather than emphasising their distinctions (see Thomas 2018).

A longer-term perspective on bodies and personhood has been presented for peninsular Italy, due to the sporadic nature of the archaeological record for earlier periods (c. 6500–4500 BC), which provides a sharp contrast to the richness of late Neolithic and Copper Age contexts. In the earlier Neolithic, bodies emerge fuzzily, represented by <500 skeletons attesting to varied funerary practices, and small numbers of handheld clay figurines (Robb 2007b). The corpus illustrates variable and heterogeneous practices which were most likely closely tied to local scales of meaning. Generally, the dead were deposited in single graves or in ditches surrounding villages, incorporating them into the space and rhythms of daily life (Robb 2007b, 56). The only discernible patterning is for females to be interred on their left side, and males on their right side (Robb 1994, 29). Figurines were similarly mostly deposited at settlement sites; although they resist typologies, there is a division between those representing breasts and those of more ambiguous sex which emphasise the head (Robb 2007b, 51). It has been argued that this gender ambiguity denotes persons who were composed of both male and female qualities, reminiscent of Strathern's (1988) partible Melanesians (Holmes and Whitehouse 1998). From the late 5th millennium BC, a changing sense of personhood is apparent through regularised depictions of the body on statue-stelae and -menhirs and more standardised grave good assemblages (Robb 2007, Chapter 8, 2008). In both contexts, maleness is emphasised through the presence of weapons, while femaleness is indicated through ornamentation. Overall, it is argued that, from a heterarchical social system which emphasised difference and bodily partibility, the increased importance of exchange gave rise to gender and prestige symbolism most obviously displayed on the surface of the body (Robb 1994, 2007, 2008). As the Tyrolean Iceman reminds us, however, there were other ways of constructing identity (Robb 2008)—his tattoos reveal intimate encounters in the process of body modification—and thus we must imagine that although personhood altered substantially over this timeframe, there would have remained the potential for different bodily performances in diverse fields of action.

For the most part, these works draw upon ethnographic constructions (see Gell 1999) of Melanesian and Indian persons to build understandings of Neolithic personhood, employing terms which are closely related to ethnographic contexts (Jones 2005). When doing so, close attention must be paid to cultural context. Dividuality, as the predominant discourse through which Neolithic persons are configured, would have varied in its social production and instantiation across the Neolithic world. One key take-away from this review is that the political foundations of personhood are often not explicitly nor strongly grounded in the major works on Neolithic Balkan and British persons, except to note the significance of community identity and ancestry. On the other hand, Robb's (2007) model of a transition to gender and prestige systems in Copper Age Italy, drawing on Thorpe's and Richards' (1984) argument for social changes in

Neolithic to Bronze Age Britain, demonstrates how changing re/presentations of the body reflect wider developments in socio-political dynamics. The range of ways to dress, display, and represent the body was restricted during the Copper-Bronze Ages, demonstrating a stark contrast with the varied and heterogeneous bodies encountered in Neolithic contexts. During the 4th–3rd millennium BC, both Britain and Malta were at the fringes of these political developments and remained culturally Neolithic. Nevertheless, the Maltese islands remained in contact with peninsular Italy and, in this context, the political role of personhood deserves greater consideration.

The modes through which personhood was formed in Neolithic Malta will have differed sufficiently from both Neolithic Britain and present-day Highland New Guinea. Inhabiting a small archipelago with a relatively ephemeral history of earlier Neolithic occupation provided the foundation for distinctly local identities and a strong attachment to place to emerge. Living bodies regularly gathered together in both small and large social units in villages and 'temples', and dead bodies were amassed in striking numbers in underground chambers. The body world of later Neolithic Malta therefore increasingly emphasised collectivity, and the only form through which bodies regularly appear solo is in figurative representations.

3.2.3 Bodies in Neolithic Malta

Aside from burials, the rich corpus of anthropomorphic figurines from the Maltese islands provide the best evidence for ideas about the body. Representations of the body span a large array of forms, and noticeably developed in style and increased in number from c. 4100 cal BC. Small clay figures of female bodies from Skorba are among some of the earliest examples (Figure 3.3), alongside incised carvings on Żebbuġ ceramics and two stone menhirs with carved faces (Baldacchino and Evans 1954; Malone *et al.* 1995; Trump 1966b; Vella Gregory and Cilia 2005). These representations are reminiscent of Italian Neolithic figurines and statue-menhirs (Robb 2008, 2009). During the Ġgantija and Tarxien phases, there is a stark change in the way the body is represented. Figurines are increasingly detailed and realistic, encompassing a wide range of sizes, and crafted from diverse materials (Stoddart and Malone 2008). Due to their principal find spots in temples and burial sites, figurines have often been interpreted as objects of ritual iconography central to rites of life and death (Malone 2008; Malone and Stoddart 2013; Vella Gregory and Cilia 2005).

Figure 3.3: Anterior and posterior view of a female figurine from Skorba dated to the Red Skorba period (Trump 2015, 34) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

Later Neolithic figurines include carved bone pendants and cow tarsals (1–5 cm in size, see Figure 3.5b), clay figurines, carved alabaster and pebbles, and limestone figures ranging from 0.3–2 m in height (Vella Gregory and Cilia 2005). Due to their diminutive size, it has been suggested that the smallest figurines were made by children (Malone 2008). Given their stylistic consistency, the much larger examples were likely crafted by specialists. Many stone figurines depict robust and fleshy bodies, with their thighs and calves rubbing together. With no bioarchaeological indicators for obesity identified amongst the Xagħra Circle skeletal assemblage thus far (R. K. Power pers. comm.), these figurines may have represented idealised notions of productivity and abundance. Smaller figurines, often made of clay, typically portray more realistic representations. Among these are the so-called ‘Venus of Malta’ from Ħaġar Qim (Figure 3.4a), and two pregnant women, one from a midden outside Tarxien (Figure 3.4b) and one found below the floor of the South ‘temple’ at Mnajdra (Figure 3.4c). On the back of the latter two figures is a vertical raised lump of clay and incised lines representing vertebrae and ribs, intriguingly demonstrating a knowledge of skeletal anatomy. Mid-sized figurines, often of ambiguous sex, tend to depict the body either sitting or standing, often with crossed arms and simplified faces (Vella Gregory and Cilia 2005, 78). They often have a flat back, indicating that they were placed against a flat surface and viewers gazes were directed toward the front of the objects.

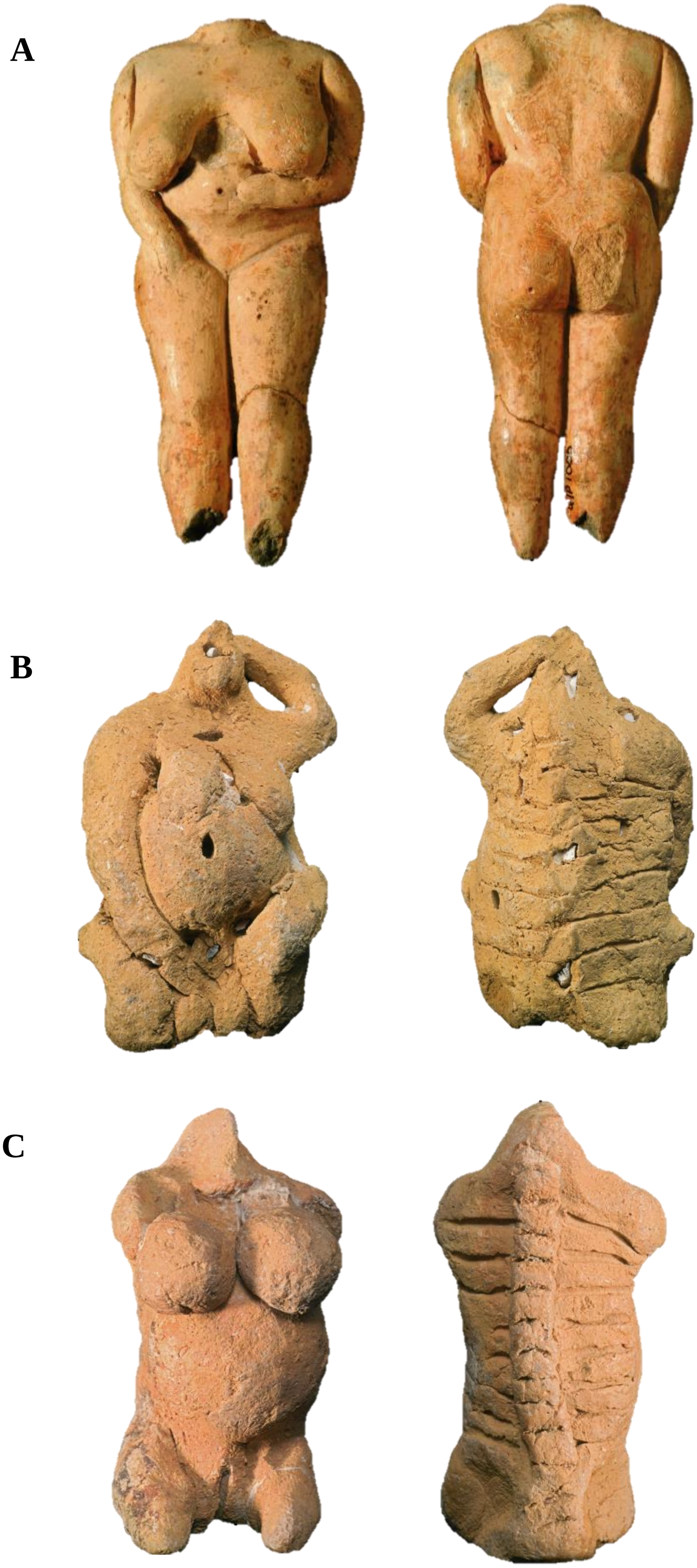


Figure 3.4: Female figurines. A: Anterior and posterior views of the ‘Venus of Malta’, 13x62.5 cm; B: pregnant figure made of clay with inserted shells from Tarxien, 5.9x3.5x5.3 cm; C: pregnant figure made of clay from Ħaġar Qim, 5.2x2.6x2.8 cm (Vella Gregory and Cilia 2005, 103, 107–108, 113–114) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

Figurines are often broken along weak areas, at the joints of the neck and limbs (Figure 3.5a). The common breakage of heads on terracotta figurines may be explained by their poor bonding to the body (Malone, Bonanno, *et al.* 2009, 311), suggesting the majority of small terracotta figures were not made to be used for long periods. A female figurine from Skorba (Figure 3.3, above) was broken and the head and body deposited in separate locations, providing an indication of early practices of figurine breakage (Trump 2015, 31). About 20 fragments from the Xagħra Circle portray body parts, some of which cannot be united with the corresponding body (see Figure 3.5c and d), suggesting they remain unexcavated or were not deposited contemporaneously (Malone, Bonanno, *et al.* 2009, 305, 311).[10] Incomplete figurines and body parts are known from Ħal Saflieni, including a terracotta torso with broken head and legs (Figure 3.5a; Vella Gregory and Cilia 2005, 53). Heads and legs have been identified as "sites of action and emphasis" as they are frequently fragmented and exaggerated in scale and style (Vella 1999). Furthermore, some figurines were purposefully created to exploit changing identities, with sockets positioned in the top of the body to hold interchangeable heads. Although there has been little research into figurine fragmentation and many lack contextual information, the intentional modelling of some figurines to exploit changing identities demonstrates a preoccupation with dividing and reconfiguring the body and its parts.

Compared to Neolithic figurines in southeast Europe, there is remarkable heterogeneity in the Maltese corpus. It is difficult to clearly identify any standard style of presenting the body except, perhaps, within size categories or at individual sites. Overall, figurines mostly emphasise bodily posture, although clothing and facial expressions are occasionally depicted. Many figurines are of ambiguous sex, and gender was seemingly of little significance in this context, posing a challenge to earlier arguments of the 'mother goddess' cult (e.g. Gimbutas 1982). Although age is harder to define, rarely are individuals of different sizes juxtaposed, and adults emerge as the dominant bodies to be represented. Furthermore, bodies are most often represented alone and independent of other persons and animals, contrasting the groups of animals carved into temple megaliths. Although the cache of handheld figurines from the Xagħra Circle, incorporating six anthropomorphic figures, two small pedestals with stone heads, and a boar or pig (Malone, Bonanno *et al.* 2009, 298–305), does suggest that figurines may have occasionally been deployed in groups.

[10] At the Circle, the largest density of figurines was excavated in (783), with several fragments in a series of other contexts including (1241) and (951) (Malone, Bonanno *et al.* 2009, 312). Given the extensive manipulation of deposits, it is difficult to be sure if they accompanied primary interments, but in the case of (951) it is possible that secondary deposition of disarticulated remains also involved the breakage and redistribution of terracotta body parts (*ibid.*).

An important feature of figurines, therefore, is their emphasis on singularity and difference. This suggests the potential for contextually-specific bodily modes and may reflect the propensity for lived bodies to shift in their configuration, perhaps in reference to gender or changing roles and identities across the life-course. Figurines illustrate that personhood was focussed on difference and distinction in this context, with bodies only occasionally represented as stable and bounded. However, little attention has been paid to the relationship between figurative representations, bioarchaeological evidence for identity and health, and the treatment of the dead body. Thus, the emerging picture of bodily difference and instability in the figurative record needs to be compared with the skeletal and burial data to produce a holistic understanding of personhood in Neolithic Malta.

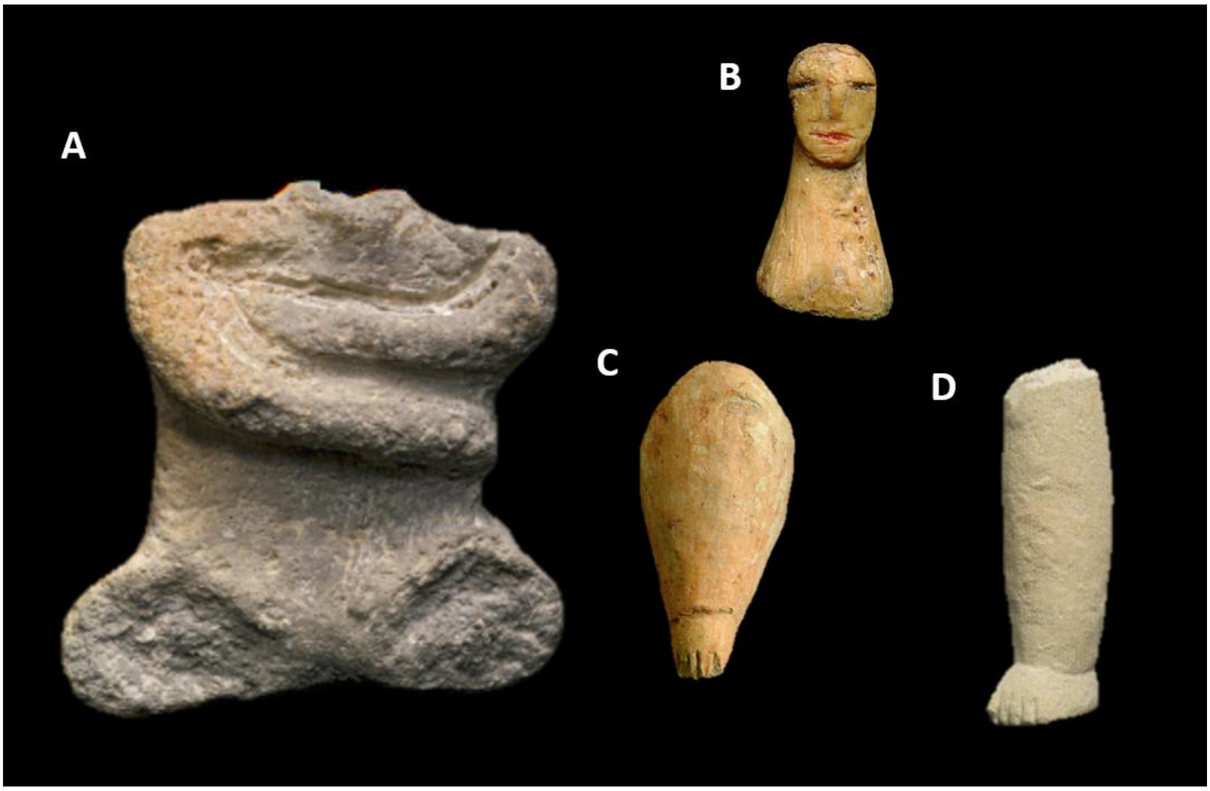


Figure 3.5: Figurines of body parts and fragments, not to scale. A: torso from Ħal Saflieni; B: faunal metatarsal with incised head from the Xagħra Circle; C: terracotta arm, and D: limestone leg from the Xagħra Circle (Vella Gregory and Cilia 2005) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

3.3 Personhood and social identity

Personhood is dynamic throughout life, changing in accordance with the ways that age intersects with other facets of identity (Fowler 2004a, 42–47). As the earlier discussion of cross-cultural deathways revealed, the life-course is also central to the form that funerary practices take. Here, two key aspects of personhood are explored to provide a framework for this study: gender and age. Practices of collective deposition in the ethnographic record often single out age as a deciding factor for differential burial treatment. On the other hand, the anthropological literature has centred gender as key to the composition of persons (e.g. Busby 1997; Marriott 1976; Strathern 1988). Yet, consideration of how gender was performed and how ageing affected social relations are often glossed over in models of Neolithic persons.

3.3.1 Sex and gender

Discussions of Neolithic personhood have frequently overlooked sex and gender (notable exceptions include Edwards and Pope 2013; Robb and Harris 2018; Whitehouse 2013). However, in a recent review of Neolithic bodily representations, funerary practices and skeletal evidence, the case is made that the general absence of clear gender distinctions is salient (Robb and Harris 2018). The occasional presence of figurines with sex-specific features, alongside ambiguous or hybrid bodies, and rare gendered burial practices, represents a striking diversity of ways in which gender was invoked. As a result, it is argued that gender may often only *appear* to be missing. While it is likely that sex and gender were important principles structuring many aspects of daily life (e.g. food preparation, farming, hunting, and gardening), gender could have been performed fluidly in many contexts and does not appear to have been politically or ideologically significant (Borić *et al.* 2013, 51; Robb and Harris 2018).

Gender is most readily (and perhaps unreliably) interpreted through artistic representations of the body, burial demographics, skeletal analysis and, most recently, aDNA studies. Small figurines in central, eastern and southeastern Europe and Italy represented females, ambiguously-sexed persons, combinations of male and female attributes, and isolated genitalia (Bailey 2005; Robb 2007b; Whitehouse 2013, 487). Referring to central and eastern European figurines, Bailey (2013, 248) suggests that it is "much more likely that more categories of identity were possible and were practiced than we realise". In terms of demographics, in early Neolithic Britain, differing ratios for male and female representation in burial monuments have been presented (Edwards and Pope 2013; Sánchez-Quinto *et al.* 2019; Smith and Brickley 2009). The most convincing argument suggests that demography differed locally according to short-lived and fluctuating performances of gender (Edwards and Pope 2013). Except for some correlations between sex and grave goods at LBK sites (see Bickle 2019; Hofmann 2009; Whittle 2013) there is very little patterning in burial practices across Europe. Presently, the only demographics available from Neolithic Malta demonstrate near-equal numbers of males and females deposited at the Xagħra Circle, yet narratives have often stressed the significant burial locations and positions of adult males (Stoddart, Barber *et al.* 2009, 321).

The skeletal evidence presents great variation and often site-specific differences in mobility, biomechanics and interpersonal violence (Robb and Harris 2018). Interestingly, analyses of long bone morphology in central Europe reveal very high upper limb loading among women (likely linked to significant time spent grinding cereals) and exceptional variation in lower limb loading suggesting they participated in a range of activities (Macintosh *et al.* 2017). While there are clear differences in lower limb morphology between males and females, these do not become significant until the Bronze Age (Macintosh *et al.* 2014). Similar sex-based divisions related to activity patterns are inferred from Neolithic Italian contexts (Marchi *et al.* 2006, 2011) and Robb (2007b, 69) also notes the distinct local practice of ablation of the anterior maxillary teeth for some females. Recent large-scale aDNA analyses have regularly identified a limited range of Y chromosome haplotypes amongst Neolithic populations, in contrast to high mitochondrial DNA diversity. This is true at sites ranging in date from the early to final Neolithic, and at the very least from central Europe (where the majority of analyses are focussed), to the Atlantic façade and Britain (e.g. Haak *et al.* 2008; Knipper *et al.* 2017; Sánchez-Quinto *et al.* 2019; Schroeder *et al.* 2019; Szécsényi-Nagy *et al.* 2015). Predominant interpretations of these data, alongside simulation modelling (Rasteiro *et al.* 2012), emphasise the widespread practice of female exogamy and patrilocality, although the actual extent and degree of movement is difficult to define. The significant role of women in these practices remains to be critically considered (though see Frieman *et al.* 2019 for queer and feminist narratives of mobility, focused largely on the Bronze Age).

Robb and Harris (2018) present a crucial point—that Neolithic gender was contextual, changing and performed in ways which are difficult for us to access—but their provocative argument is somewhat let down by its focus on bodily difference. They note the problems with linking gender identity to the body and therefore to sex (following Butler 1993), but for the sake of methodological continuity with analyses of gender in later periods, they do just that. Although they acknowledge the clear difference in how gender was constructed in the Neolithic, there must be a way forward which also establishes methodological distance from gender essentialism. It is apparent that, despite ambiguous bodily representations and a lack of concern for displaying gender in burial assemblages, there were some real binary divisions in mobility and activity patterns across Neolithic Europe. While these practices were surely related to the construction of gender identity, they do not tell us how gender was composed, displayed and performed most of the time. Most likely, this too was not just locally but also contextually-specific (Robb and Harris 2018). From the 3rd millennium BC, however, drastic changes occurred in the representation of the body, seemingly tying gender performances more closely to sex (Harris *et al.* 2013, 74). Malta, however, was still culturally Neolithic and maintained different practices and a distinct political trajectory until at least 2350 cal BC (Malone *et al.* 2019; Robb 2007b, 329–334).

3.3.2 Age and ageing

If gender has often slipped by unnoticed, age and the process of ageing arguably forms even less of a concern in many discussions of Neolithic life. A concerted effort to address children and childhoods in the past emerged only after feminist discourse had begun to undo the biases of androcentric research (e.g. Lillehammer 1989; Moore and Scott 1997; Sofaer Derevenski 1994). The literature on children in archaeology and bioarchaeology has greatly increased over the past two decades (e.g. Baxter 2005a, 2005b; Coşkunsu 2015; Kamp 2001; Lewis 2007; Mays *et al.* 2017; Murphy and Le Roy 2017; Power 2011; Sofaer 2000). However, in the recently published *Oxford Handbook of the Archaeology of Childhood*, there are only a handful of references to the Neolithic; surprisingly, the Palaeolithic is more frequently discussed (Crawford *et al.* 2018). Yet, as we have seen, age is often a deciding factor in burial location or mode and is socially constructed and intersected with gender in variable ways. With recent research emphasising a more holistic approach to ageing, be it through the lens of the life-course (Gilchrist 2012) or osteobiography (Hosek and Robb 2019; Stodder and Palkovich 2012), there is much opportunity to examine how age affected personhood and deathways in Neolithic Europe. The discussion here will be tightly focussed, highlighting the depositional pathways of nonadults, and briefly outlining the limitations of skeletal evidence for discerning turning points in adult lives, as key points of comparison for the Maltese data.

A review of Neolithic Italian burials shows that children were more often disarticulated at caves and open-air sites than adults and, when in graves, tended to lack grave goods (Robb 2002, 2007). Similarly differentiated funerary practices continue into the Copper Age. At the necropolis of Remedello di Sotto, foetal and neonatal remains were under-represented (de Marinis 2013) and Gaudo culture tombs in southern Italy contain fewer than expected neonatal and infant remains (Bailo Modesti and Salerno 1998). When children are represented in funerary contexts, they typically lack grave goods and are less likely than adults to be disarticulated and circulated post-mortem (Colini 1898; Muntoni 2001). Similar patterns are evident in Copper Age Iberia and along the Atlantic coast of Portugal, where nonadults are relatively well-represented, but infants and children <3 years old are lacking (Beck 2016; Waterman and Thomas 2011). Demographic analysis of a large dataset from megalithic sites in northern Spain dating from the 4th–mid 2nd millennium BC revealed that the presence of children <5 years old (based on MNI) was consistently lower than expected according to model life tables (Fernández-Crespo and de-la-Rúa 2015). In Neolithic France, individuals <5 years old are also significantly under-represented in settlement and funerary contexts (Le Roy 2017). Within early Neolithic British long barrows and chambered tombs, age has been argued to be a more discriminating factor mediating interment than gender, although there is a high degree of variation across sites (Smith and Brickley 2009).

Interestingly, infants and young children are frequently encountered as later depositions within these monuments, a practice which perhaps highlighted the liminal place of infants within the life-course during the late Neolithic and Early Bronze Age (Finlay 2000; Smith and Brickley 2009, 140). Similar arguments are put forward for Neolithic France and Copper Age Iberia, where the dearth of young children suggests they were not fully socially integrated, or had yet to attain personhood (Beck 2016; Le Roy *et al.* 2018). The less formalised treatment of children in Neolithic Italy, and the lack of curation of their remains, also arguably places them at the margins of society (Robb 2007b, 63).

The study of children and childhood in Neolithic Malta has received relatively little attention to date. In part, this may rest on their apparent invisibility in the artefactual record; miniature figurines have been argued to be 'toy-like' and therefore perhaps produced by children (Malone 2008, 101), but children are largely not depicted figuratively. The only obvious representation of a child is an infant sitting on the lap of an adult in the seated pair figurine from the Circle (Figure 3.6), although figurines with 'swollen bellies' and large breasts appear to depict pregnancy and motherhood (see Vella Gregory and Cilia 2005, 54).[11] This apparent absence of young individuals in the material record is not supported by the bioarchaeological record. Current evidence demonstrates the presence of nonadults of all ages at the Xagħra Circle, including neonates and infants (Stoddart, Barber, *et al.* 2009, 321), although it remains to be clarified whether this was also the case at contemporary burial sites. Malta therefore presents a point of difference from much of Europe during the 4th–3rd millennium BC, yet current research suggests a degree of analytical bias in approaches to Neolithic Maltese identity which foreground adulthood.

[11] Similar figurines from Çatalhöyük have been argued to represent ageing and maturation (Pearson and Meskell 2014, 241).

Figure 3.6: Seated pair figurine found face-down in (831) in the upper levels of the Shrine. The figure on the right side grasps an infant (with head detached) while the figure on the left cradles an offering bowl. The heads of both adults and the infant are removable and only the head of the right individual was not recovered from the site (Malone, Bonanno *et al.* 2009, 289–298). Reproduced with the permission of Anthony Bonanno.

What, then, of the adults who comprise most of the burial population during this period? Ironically, due in part to the complexities of ageing adults skeletally (see Falys and Lewis 2011), it is often difficult to distinguish important stages in their lives. Yet, ageing would presumably have afforded individuals the ability to participate in more social, ritual and economic activities as they passed through culturally-specific rites of passage and gained necessary skills. More importantly, the longer you lived, the more of your age cohort you outlived—a phenomenon which would have been socially recognised and likely marked out (Robb 2007b, 66). In the context of Neolithic Malta, the inferred skilled adult roles which have received much attention include those of ritual specialists, and overseas travellers and traders (e.g. Robb 2001; Stoddart *et al.* 1993). While these were no doubt critical positions which would have carried authoritative weight in some contexts, they were also probably held by comparatively few members of society.

Young individuals are frequently under-represented in burial contexts and, in most cases, this is not solely due to taphonomic bias. The difference presented in Malta suggests an exciting area for further exploration, including the need to study demographics at contemporary burial sites, and to examine how individuals of different ages were treated after death. In contrast, adult bodies appear almost homogeneously to populate Neolithic worlds, comprising most burial populations as well as figurines and imagery. Yet, ageing and senescence have rarely been explored and adulthood is often presented as a long period of stasis (or physical deterioration), even though growing old in prehistory was a regular occurrence. Moreover, it would likely have afforded individuals with increased respect and authority as well as important skills (for example, in storytelling, land management, and long distance navigation) and knowledge (for example, when the last famine was, where to find plants with medicinal properties, how much effort it took to construct the last temple) to be transmitted to younger generations (Appleby 2018).

3.4 Deathways and the social lives of the dead

At this point, it is best to start at the beginning, or the end (depending on your point of view), by posing the question: what is death? The influence of modern Western medicine is such that the definition of death has been reduced to a single biological moment, when the heart stops beating. Yet, even within the boundaries of medicine, what we know about death is continually changing. Recent research has found that cardiac arrest patients remained aware during resuscitation (Parnia *et al.* 2014), and brain activity has been detected for up to 10 minutes after death (Norton *et al.* 2017). It is not just consciousness that continues after 'death'; studies on zebrafish and mice recorded activity in >1000 genes after organismal death, principally in transcripts relating to immunity and inflammation (Pozhitkov *et al.* 2017). Physiologically, death is a complex and slow process of cellular shut down. It is not surprising that we should be shocked and disoriented at the pronouncement of death when some biological functions persist even after the heart stops. Moreover, medical definitions of death often meet with opposition on religious and cultural grounds, where a different understanding of death has spiritual or ontological significance (Appel 2005). Dying is thus both a biological and social *process*, and while this is often overlooked, even contemporary Western medicine understands this to be the case.

There is a lesson here for archaeologists, and it principally involves re-positioning the role of the dead body in our narratives, paying attention to the processes and practices which mark death and dying. Just as biological definitions may differ according to the cessation of cardiac or brain function (Appel 2005), social death is widely variable in relation to cultural beliefs and funerary practices. As Kellehear (2007, 16) discusses, dying may be understood as "the death of one's identity", and this death of the 'self' may not occur simultaneously with biological death. The dead often maintain a presence among the living community in some form or another. For the Huron-Wendat, the souls of the dead are present around the village until it is relocated, every 10–12 years, when the dead are transferred collectively into burial pits during 'Feast of the Dead' rites (Figure 3.7; Seeman 2011; Trigger 1969). Similarly, in Tana Toraja (Indonesia), the dead retain consciousness and continue to live after death in Puya, the land of the dead (Figure 3.8; Hollan and Wellenkamp 1996, 180). Death and dying are therefore contextual processes which are negotiated through structured rites and emotional events.

A variety of actions, often involving the dead body, may be required to properly deal with death. Preparations for a 'Feast of the Dead' included exhuming the remains of all adults who died 'normal' non-violent deaths from the village cemetery, cleaning their bones, and bundling them up to be carried during a procession to their final burial place (Trigger 1969, 108). That deceased Torajans live in Puya is ensured through constant interactions between living relatives and their dead ancestors. For several years after death, the deceased are merely thought to be ill, and it is expected that the dead will remain at home to be dressed and fed every day (Hollan and Wellenkamp 1996, 183; Tsintjilonis 2000, 5). Even once they are placed in cliffside tombs, annual *ma'nene* rites ensure that the dead are presented with offerings, washed, dressed and photographed with their living relatives (Hollan and Wellenkamp 1996, 175). These actions make sense, in culturally-specific ways, of a biological reality. As such, death is fundamentally an ontological transformation effected through social events and practices. These practices, or deathways, can directly acknowledge the agency of the dead and extend their social life—this is what Kellehear (2007, 25) terms "social dying".

Despite decades of archaeological studies of death and burial (e.g. Boddington *et al.* 1987; Chapman *et al.* 1981; Downes and Pollard 1999; Fahlander and Oestigaard 2008; Gowland and Knüsel 2006; Parker Pearson 1999), the nature of death and dying as *social* processes has typically gone unrecognised (Robb 2013). There are at least two explanations for this lack of explicit engagement with death. Firstly, both Robb (2013) and Nilsson Stutz (2016a) chart the long-lasting effects of early discourse, especially Hawkes' (1954) ladder of inference, which warned of the difficulties of theorising past beliefs. Secondly, despite the diverse beliefs held by archaeologists about death, Western traditions exemplify dead bodies as mere matter or objects which have no capacity to act in the world (Robb 2013). As a result, human remains are often conceived as another kind of material culture; their affordances and affects are not taken seriously, and appreciation of the cultural diversity of approaches to death is stymied (see Nilsson Stutz 2016a for further discussion of the ethical corollaries of this).

Cross-culturally, across diverse regions and throughout time, death is a powerful biological reality which impacts social life, initiating a series of transformations which extend beyond the body. A theoretical approach which positions the dead body as simultaneously a biological and cultural entity therefore reframes traditional archaeological approaches to death, dying and deposition.

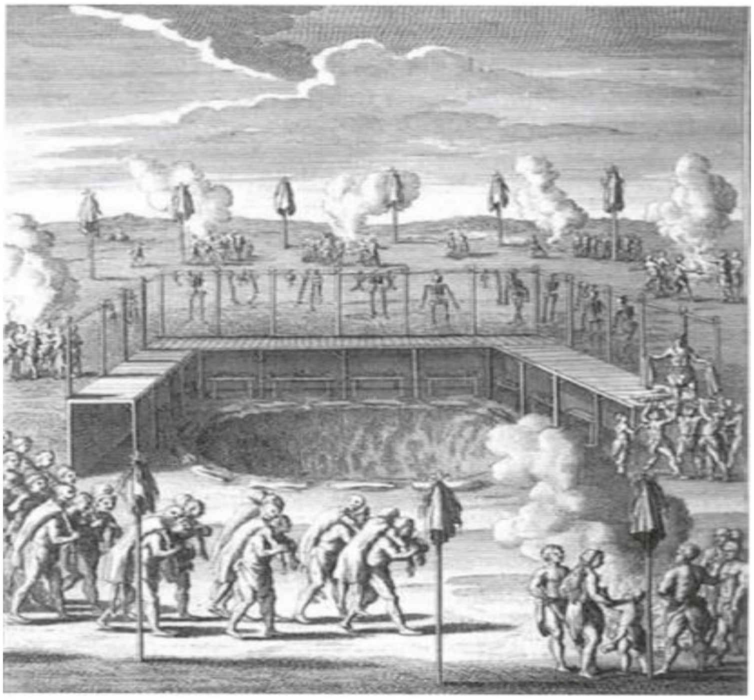


Figure 3.7: The Huron-Wendat ‘Feast of the Dead’ after Lafitau 1724, plate 41 (Creese 2015, 356). Reproduced with the permission of John Creese.

Figure 3.8: Cliff side effigies of the dead in Tana Toraja (image "P1110705" by astrobri reproduced under CC BY-NC-SA 2.0 license).

3.4.1 Processing death and dying

Much attention in previous research has been paid to the materiality of the dead body as a site for constructing identity and personhood. Yet, it is increasingly acknowledged that we have been guilty of emphasising the end stage of mortuary rites (Fowler 2013; Graham 2015), overlooking the material qualities of the dead—especially the soft tissue of flesh, hair and nails—which so often elicit strong emotions (e.g. Kus 1992). This results in an affective disconnect in our narratives and may be at least partly attributed to Western deathways, which frequently hide the corpse and arrest decomposition through practices such as embalming (Ariès 1976, 87). Although the postmodern paradigm challenges Cartesian dualisms, accounting for the vibrancy of non-human animals and materials in social relations (e.g. Thomas 2015), there is still some work to be done in the realm of funerary archaeology. As a starting point, it is necessary to 're-embody' archaeologies of death (see Devlin and Graham 2015; Oestigaard 2004; Nilsson Stutz 2008; Nilsson Stutz and Tarlow 2013), examining the role and treatment of the dead body in the process of dying socially.

The expected sequence of funerary rites was classically set out by Van Gennep (1960), who traced a tripartite structure to transformative rituals across cultures (e.g. initiations, marriages, funerals). In the pre-liminal phase, the deceased are either physically or symbolically separated from the living. For example, they may be removed from their home (as is still commonly the case), or a taboo may be put on their name (as among some Aboriginal Australian and Torres Strait Islander cultures, see McGrath and Phillips 2008). The liminal phase denotes the status of the dead before they are properly transitioned and is usually associated with the process of decomposition. This period for the Dayak (Borneo) is marked by temporary burial; the souls of the dead remain restless while flesh still adheres to the bones and, during this phase, the mourners are similarly in transition (Hertz 1960, 40). Exhumation, cleaning of the bones and final deposition ensures that the soul can enter the next world (Hertz 1960, 58). In the final post-liminal stage, those close to the dead are reintegrated fully into the community after the dead reach their final destination. This period may be prolonged through revisiting the dead (as in the case of the Torajan *ma'nene*, see Tsintjilonis 2000) or commemorating them. The timing of each of these stages various both across and within cultures and, indeed, these stages are not universal to all death rituals. However, Van Gennep's model is useful for considering the practices through which death and dying are shaped.

The most significant moments in the funerary process are typically the initial separation of the dead from the living, and their final incorporation into the world of the dead. These stages often elicit culturally-structured emotions and responses. Often, the liminal state occupied by the corpse evokes ambivalence. Even though the dead may be grieved, missed, and remembered with affection, if they have not yet completed their post-death journey, the physical state of their remains can serve as a dangerous or polluting reminder of the proximity of the dead. Reconstructing the process of Mesolithic burials at Zvejnieki (Latvia), the regular rite of primary interment soon after death has been argued to represent a prescribed ritual process organised to offset anxiety surrounding the ambiguous state of the corpse (Nilsson Stutz 2016b). This was felt to such an extent that the dead were often transformed prior to burial; they were tightly wrapped in shrouds and their faces were often covered with clay 'masks', obscuring and/or altering their identity (*ibid.*). Even after deposition, the dead may continue to exert some form of agency or power over the living. For the Merina (Madagascar), regular *famadihana* rites of exhumation and rewrapping ancestral bundles appeases the dead by showing them that they are remembered and cared for (Graeber 1995). In return, kin expect to receive blessings from their ancestors, in the form of good health and fortune (*ibid.*). Through continuing to intervene with their remains, they are progressively disintegrated, and this practice manages the longevity of the ancestors in social memory (*ibid.*).

As these examples have shown, funerary rites relate to both the physical and metaphysical qualities of the dead body, but personhood and the composition of living bodies are also influential. Among the Torajans, bodies are characterised by their qualities of softness, wetness and hardness in relation to their age. Generally, stillborn babies are 'wet', children who haven't cut their teeth are 'soft', and adults are 'hard'; these affordances inform the length of time it takes the life-spirit to leave the body and, as a result, the extent and form of funerary rites (Tsintjilonis 2000). Age also affects funerary practices among the Huron-Wendat. Final rites of secondary deposition were not extended to those who died in unusual, suspicious or violent circumstances, nor to children or the elderly, as their souls were not deemed strong enough to reach the village of the dead (Seeman 2011; Trigger 1969, 104). In these cases, biological markers of ageing are underwritten by beliefs about the qualities and abilities of the body throughout the life-course, and these converge with individual death courses.

Different parts of the person may be treated differently according to their qualities. Drawing on ethnohistoric sources relating to the composition of Mayan bodies, Duncan and Schwarz (2014) show how the separation of different body parts in a Mayan mass grave related to significant aspects or essences of personhood. Statistical analysis of the spatial location and association of skeletal elements showed that crania and long bones were clustered separately, maxillary molars were under-represented and, while left ulnae and radii were often articulated, right ulnae and radii were either disarticulated or removed from the grave. The head and skull were associated with *baah* (self or personhood), while the removal of teeth referenced *ik'* (the breath soul associated with paradise after death). The violence enacted to these parts of the body amounted to a denial of personhood and the right to an afterlife for these individuals. The treatment of the dead is therefore flexible according to facets of an individuals' biography and to culturally-specific conceptions of personhood. Amongst cultures who conceive of persons as internally divided or partible, funerary rites may directly reference significant parts of the body and their associated qualities.

From this discussion, some similarities across cultures are apparent: 1) handling and engaging with the dead reformulates their social and ontological position; 2) this is achieved through a sequence of actions which may extend over a long time frame; 3) these actions differ even within cultures, according to understandings of personhood or circumstances of death; 4) funerary practices help to manage the memory of the dead. Significantly, funerary practices relate to the dead body in several key ways. Cultural conceptions of personhood, individual biographies, the ways people died, the types of death they experienced, and the physiological process of decomposition all shape mortuary rites. Archaeological bodies therefore provide a way in to considering the process of dying in the past.

3.4.2 An archaeology of dying

Bodies *are* the history of their social relations, but they are socio-culturally shaped through engaging with their physicality (Harris and Robb 2013a, 16). This history of embodiment, of inhabiting and navigating the world in similar forms, extends to a shared history of dealing with the problem of the body at death. Growing sociological research on death and dying (Kellehear 2007, 2009) has inspired a movement toward an archaeology of dying. In developing an archaeological approach to death and dying, Robb (2013) and Nilsson Stutz (2016a) both identify several core points:

- The biological transformation of death is the material basis for social and ritual actions which seek to ensure that the dead transition into a new type of being.
- The treatment of the dead is informed by ontological beliefs about the body (the 'body world'), the process of dying, and often about concepts of the 'good death'.
- Just as there exist many varied, and sometimes contradictory, ways to be embodied, funerary practices are always multiple and changing, responding (amongst other issues) to circumstances surrounding death.

While the social and cultural transitions surrounding death extend beyond the dead body, they all begin with and build upon the biological reality of death. Methodological tools to integrate the analysis of human remains with an understanding of the processes effected upon death are required. In many ways, an archaeology of dying is a call for bioarchaeologists to more regularly incorporate archaeothanatology and taphonomy in their analyses (Knüsel and Robb 2016; Nilsson Stutz 2016a, 23; Robb 2013, 447). Achieving the transition to death, as we have seen above, often involves handling and processing the remains of the deceased, sometimes in ways which can be recognised archaeologically.

If burials are understood as "the materialized traces of ritual treatment of the dead" (Nilsson Stutz 2016a, 15), collective depositions represent long histories of ongoing ritual practices and interactions with the dead and their remains. Unsettling the ontological boundary between life and death, and accounting for the vibrancy of the material remains of the dead, we can entertain the notion that "the life-course of a social being can extend beyond biological death" (Robb 2013, 447). This perspective draws on Kellehear's (2007) assessment that dying in the prehistoric past would often have been sudden and the foreshortened experience of facing death motivated prolonged post-death rites and practices. Though we may offer bioarchaeological evidence to the contrary, for example in cases of chronic illness or disease, his interpretation offers up an important point for consideration. Aligned with a wealth of ethnographic evidence for the extended social process of dying, we can no longer deny the ontological, social, emotional and political significance of funerary practices in the past.

3.5 Bridging bodies, personhood and deathways

This chapter has journeyed from historic North American Huron funerary practices to deposition in Malta around 3000 BC, with quite a few stops along the way. The aim of this journey has been to think through the relationship between bodies, personhood, and the configuration of deathways, as phenomena which are culturally and contextually shaped. Examining the body across cultures, it was argued that bodies are always performed in multiple ways depending upon situations and relations. Similarly, although there are several dominant modes of understanding personhood, this is also fluid and multidimensional. Summarising research on personhood in Neolithic southeast Europe, Britain and Italy, broad traditions emerge, including highly varied deathways and frequent disarticulation, as well as a lack of gendered representations and practices. Funerary treatment, figurines and embodied practices all provide insight into conceptions of lived bodily experiences and personhood.

The body in life is the foundation on which deathways are shaped. Reviewing cross-cultural interactions with the dead, it is clear mortuary practices are closely related to both ontologies of the body and circumstances of death. They are flexible practices which revolve around meanings often drawn from metaphorical understandings of the body. As such, it is crucial to examine how identity was negotiated, performed and represented during life, to better contextualise deathways. Furthermore, where engagement with the dead is prolonged post-mortem, as is often the case in collective deposition, the social process of dying may be extended. These rites continue to reshape understandings of the dead individual, according them some continued measure of agency. Direct actions involving the corpse or their skeletal remains are therefore important indicators of cultural understandings of the body and the process of dying, and at least some of these actions are visible archaeologically.

Malta represents a distinct case, with the most flamboyant megalithic architecture, figurative representations and collective depositions in the central Mediterranean during the 3rd millennium BC. Yet, a holistic perspective on the body in Neolithic Malta has yet to emerge (although Stoddart and Malone 2008 provide the most comprehensive overview), with much discussion fragmenting bodies into separate domains (e.g. Turnbull 2002; Vella Gregory and Cilia 2005). Reviewing the figurative record, I suggested that personhood was strongly founded on emphasising bodily difference. This claim will be explored further through analysing the treatment and presentation of dead bodies, asking how the burial programme responded to the performance of bodies and personhood in life. Central to this analysis is defining how the dead were interacted with, at what stages post-mortem, and whether these practices differed according to age or sex. In doing so, we can ask firstly how dying was achieved in relation to key facets of identity and, secondly, how post-mortem rites reformulated personhood in death. These two themes will be returned to in Chapter 9, drawing together a fuller understanding of personhood in Neolithic Malta.

CHAPTER FOUR

THE XEMXIJA TOMBS AND XAGĦRA CIRCLE

4.1 Overview

The Xemxija tombs and the Xagħra Circle comprise the largest and best recorded late Neolithic burial assemblages from the Maltese islands, forming the dataset for this research. As assemblages are modified from their excavation through to analysis, it is essential to reconstruct the biography of complex assemblages such as these (Baustian *et al.* 2014, 267; Knüsel and Robb 2016). In order to do so, the chronology of both sites is outlined, followed by a summary of their excavation methods, layout and key contexts, curation history, and the results of prior analyses. Diverse methods of excavation and curation present some challenges to working with this material.

An overview of previous analyses of the skeletal material reveals that taphonomic analysis has only been applied on a small-scale (Duhig in Malone *et al.* 1995; Duhig 1996) to a subsample of the Xagħra material. In §4.2.4 and §4.3.5, it is argued that taphonomic analysis of these assemblages will provide additional, novel insights into funerary practices. Finally, the impact of previous work on the sampling strategy, methodology and results of this research is discussed.

4.2 Xemxija Tombs

The Xemxija Tombs comprise seven rock-cut tombs in the Upper Coralline limestone of the Xemxija plateau, on the crest of a hill overlooking St. Paul's Bay (Figures 4.1–4.2). Tombs 1–6 were excavated by John Evans in 1955 (reported in Evans 1971), while Tomb 7 was accidentally discovered in 2001 and cleared before intervention by the Museums Department (Pace 2004, 164).

Each tomb is reached through a small entrance shaft in the plateau which may have originally been blocked by large stones (Figure 4.3; Trump 2002, 162). The entrance shafts lead to dome-shaped chambers, some with steps preserved in the rock (see Appendix 2.1 for plan and section drawings of each tomb). The tombs may have initially presented as cavities in the limestone which were subsequently enlarged. Tombs 1 and 2 have three internal lobes, supported by limestone columns; these tombs are now inter-connected but were originally constructed separately. Tombs 3 and 4 are simpler, both with a single kidney-shaped chamber. Tomb 5 is the most complex, with five lobed chambers radiating from the entrance. These chambers provided extra space for deposition, with partitions to ensure roof stability. The width of each tomb varies from 3.12–5.62 m, with the roof height averaging only 1.25 m (Evans 1971, 113). Tomb 6 was originally thought to be a single chamber but recently a second, partly collapsed, chamber was found to the other side of the shaft (Trump 2002, 162). This is designated as Tomb 7, the only tomb from which human remains have not been curated.[12]

All except Tomb 4 contained ceramics (Appendix 2.2), including bowls with chequered designs characteristic of the Ġgantija phase (Evans 1971, 112–116). Some tombs may have been constructed during the Ġgantija phase, while Tomb 5 possibly dates to the later Saflieni phase (Evans 1971, 115; Pace 2004, 165). Intriguingly, this tomb contained the largest artefactual assemblage, including 12 ceramic bowls and basins, as well as personal ornaments (five *Spondylus* shell v-perforated buttons, two *Spondylus* shell beads, three shell pendants, and two miniature greenstone axe pendants) (Evans 1971, 115). Bronze Age ceramics were found near the surface of the deposit in some tombs and deemed intrusive (Evans 1971, 113).[13]

Finds in the surrounding landscape indicate that the Xemxija plateau was also a settlement locale. Scatters of Ġgantija phase sherds have been found around cliffs to the north of the tombs, possibly indicating domestic occupation (Trump 2002, 164; Sagona 2015, 59). A large cave to the west was occupied until recently and may have once contained prehistoric deposits (Evans 1971, 112; Trump 2002, 164). Furthermore, nearby megalithic slabs, partly obscured by vegetation, may also represent the remains of a 'temple' structure (Trump 2002, 164).

[12] Although it cannot be confirmed, it is likely that intact burial deposits were preserved in Tomb 7, given the contents of Tombs 1–6.
[13] It is possible that interments were made during this phase, but according to current radiocarbon dating this does not appear to be the case.

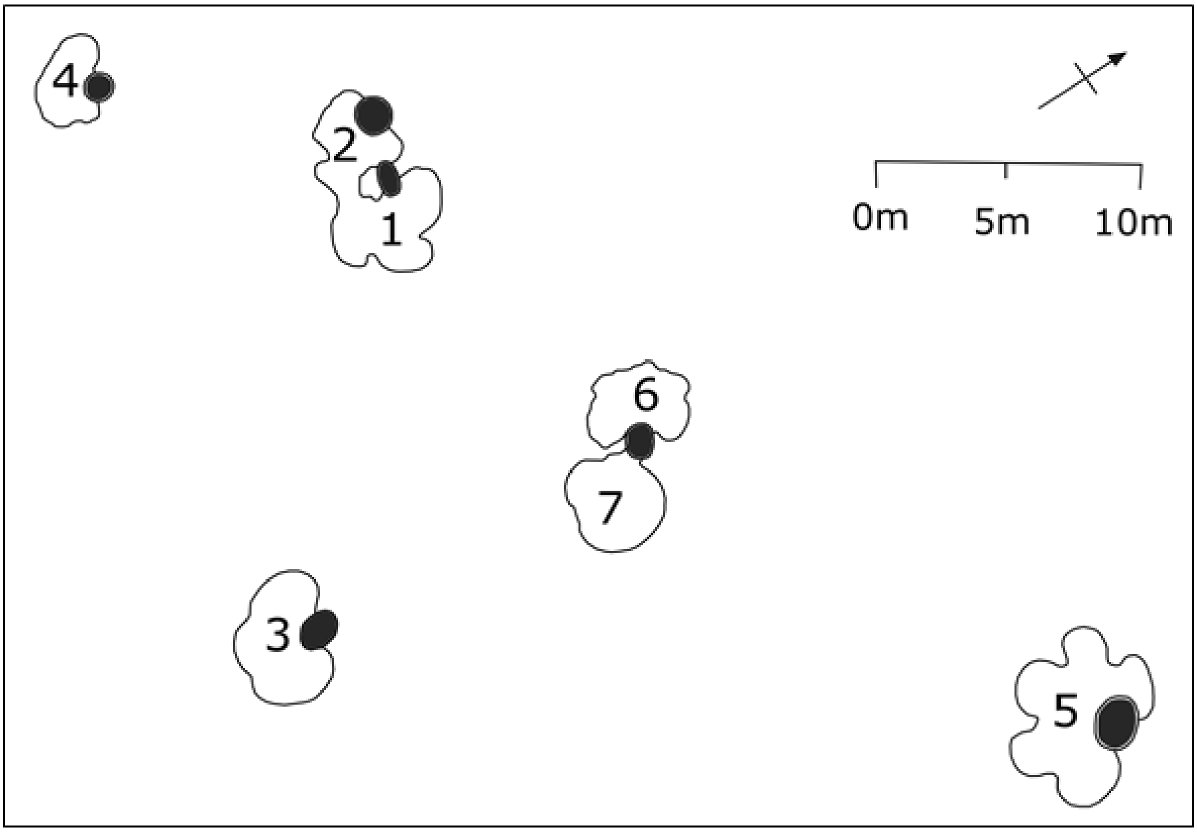


Figure 4.1: Plan of the Xemxija Tombs (redrawn after Trump 2002, 163).

Figure 4.2: View from the Xemxija plateau, looking west (photo by author).

Figure 4.3: Entrances to Tombs 1 and 2 (left) and Tomb 5 (right), photos by author.

4.2.1 Chronology

Five radiocarbon dates for the Xemxija tombs were recently obtained from human dentine .[14] These illustrate deposition between at least 3500–2450 cal BC (Table 4.1). These dates confirm the excavator's view, based on ceramic typology, that the tombs were used throughout multiple cultural phases (Evans 1959). There is no indication of Żebbuġ use, but deposition traversed two major phases, the Ġgantija and the Tarxien. One date (UBA-35297) bridges the hiatus between use of the rock-cut tomb and the main hypogeum at the Xagħra Circle, revealing ongoing depositional activity in the wider landscape during the late Ġgantija and Saflieni phases.

Sample	**Lab code**	**BP**	**±**	**C:N**	**Coll yield**	**95% CI calibrated range**	**Cultural phase**
XEM8781.17.37	UBA-35294	4602	31	3.26	3.9	3500–3140	Mġarr / Ġgantija
XEM9130.11.37	UBA-35297	4442	33	3.22	1.9	3330–2930	Ġgantija
XEM8783.17.37	UBA-35295	4177	36	3.22	1.7	2890–2630	Saflieni / Tarxien
XEM9140.11.37	UBA-35298	4168	38	3.22	2	2880–2630	Saflieni / Tarxien
XEM9129.11.37	UBA-35296	4068	46	3.23	4.1	2860–2480	Tarxien

Table 4.1: Radiocarbon dates from the Xemxija Tombs (McLaughlin, Power *et al.* forthcoming).

[14] Five mandibular left second molars were sampled, ensuring no double-sampling of a single individual.

4.2.2 Excavation

Despite Evans' excellent excavation record, little is known about the excavation of Xemxija Tombs 1–6. Evans did not publish a detailed report, noting only that local workmen carried out the excavation and that the tomb contents were sieved (Evans 1971, 112). Although the depth of deposits differed in each tomb (up to 0.8 m), most were observed to have two fills: an upper brown clay layer and a lower deposit of white lime coloured with red ochre. In Tombs 3 and 5, however, three fills were observed: an upper brown clayey horizon, a thin grey-white lime horizon, and a base of compact red ochred earth (Evans 1971, 113). The lowest fill contained the main burial deposit, with pottery from multiple periods mixed in the upper fills. There does not appear to have been any stratigraphic or contextual recording of the human remains or small finds, although the material culture from each tomb is described in detail (Evans 1971, 112–116). Unfortunately, there is no such detail regarding the human remains, and no excavation plans have been found in Evans' archive (Todd Whitelaw pers. comm.).

4.2.3 Curation

Following excavation, the remains were shipped to the Institute of Archaeology, University College London (UCL), UK and incorporated into the teaching collection (Whitelaw 2013). When the human remains were received at UCL, they were packed in 99 bags, numbered sequentially. The bags were originally numbered according to specific tombs, but when the remains were packed for storage in 2008, these numbers were grouped, and the tomb associations lost.

The assemblage is curated in 19 boxes, with human remains in 18 boxes and animal remains in one box. The bag numbers were found to have been aggregated, and the original curation strategy had dissolved. For example, it was noted that bag 6 was originally labelled 'Tomb 6' but there is now no individual bag labelled with this number. Instead, there is an aggregate category for 'bags 1–7' in which the original contents of bag 6 have presumably been placed. Bag contents have also passed through a sorting process, and this was identified by the primary analysts. Silvia Rodgers and Gladys Pike noted that "some peculiar sorting has taken place before the bones were finally dispatched to England. No aim or method can be detected." (Whitelaw 2013). Each bag contained bones of a similar type (e.g. hand and foot bones, see Figure 4.4) and the bags in each box were representative of most skeletal regions.

Since no excavation records survive, it is impossible to identify the original tomb from which any of the remains derived and the assemblage must be treated as an aggregate deposit. This impacts the demographic quantification of the remains and the interpretation of depositional practices. It is likely that different numbers of individuals were deposited in each tomb, as at the Ta' Trapna iz-Żgħira tombs (Baldacchino and Evans 1954), and, further, that each tomb was in use for a different length of time. Taphonomic analysis and radiocarbon dating of the Xemxija human remains, however, cannot resolve such questions.

Figure 4.4: The contents of one bag, containing mostly metatarsals and phalanges (photo by author).

4.2.4 Prior analysis

The human and animal remains from the Xemxija Tombs were originally analysed by Gladys Pike (1971a, 1971b), with the human dentition described by Sylvia Rodgers (1971). The analysis of the human remains was brief and focussed mainly on pathology and demography, showing that individuals of all ages, from perinatal to adult, were interred in the tombs. A lack of old adults was noted (Pike 1971b, 236), principally related to low dental attrition and a lack of age-related osseous change. However, osteological ageing methods tend to under-represent elderly individuals, and dental attrition has proven a poor tool for age estimation in prehistoric Maltese populations (Stoddart, Barber *et al.* 2009, 318). There were low incidences of palaeopathology, with healed fractures to one clavicle and two tibiae, and two elements with active lesions, while the dentition showed low incidence rates caries, abscesses and periodontal disease (Pike 1971b; Rogers 1971). Both the human and animal remains were noted to be fragmentary and eroded. Pike (1971b, 236) observed that small bones, mostly of the hands and feet, were the most well-preserved elements.

The relative frequency of skeletal elements, tabulated from Pike's results (see Appendix 2.3), is presented here as a percentage of the total assemblage (Figure 4.5). From almost 12,000 fragments, long bones seem to be heavily under-represented in comparison to crania, the axial skeleton, and hand and foot bones.[15] There is currently no MNI estimate for the tombs, which is further complicated by the lack of contextual data, as an estimate from the aggregated assemblage will almost certainly be an under-representation. However, MNI calculations will facilitate analysis of element representation. This is critical, as it is widely noted that the remains from the Xemxija tombs have not undergone detailed analysis since their excavation (Sagona 2015, 64; Trump 2002, 164) and much remains to be understood about the formation of the burial deposits. Assessing fragmentation according to element type and analysis of the preservation and condition of the skeletal material will provide insight into both the depositional environment and funerary practices.

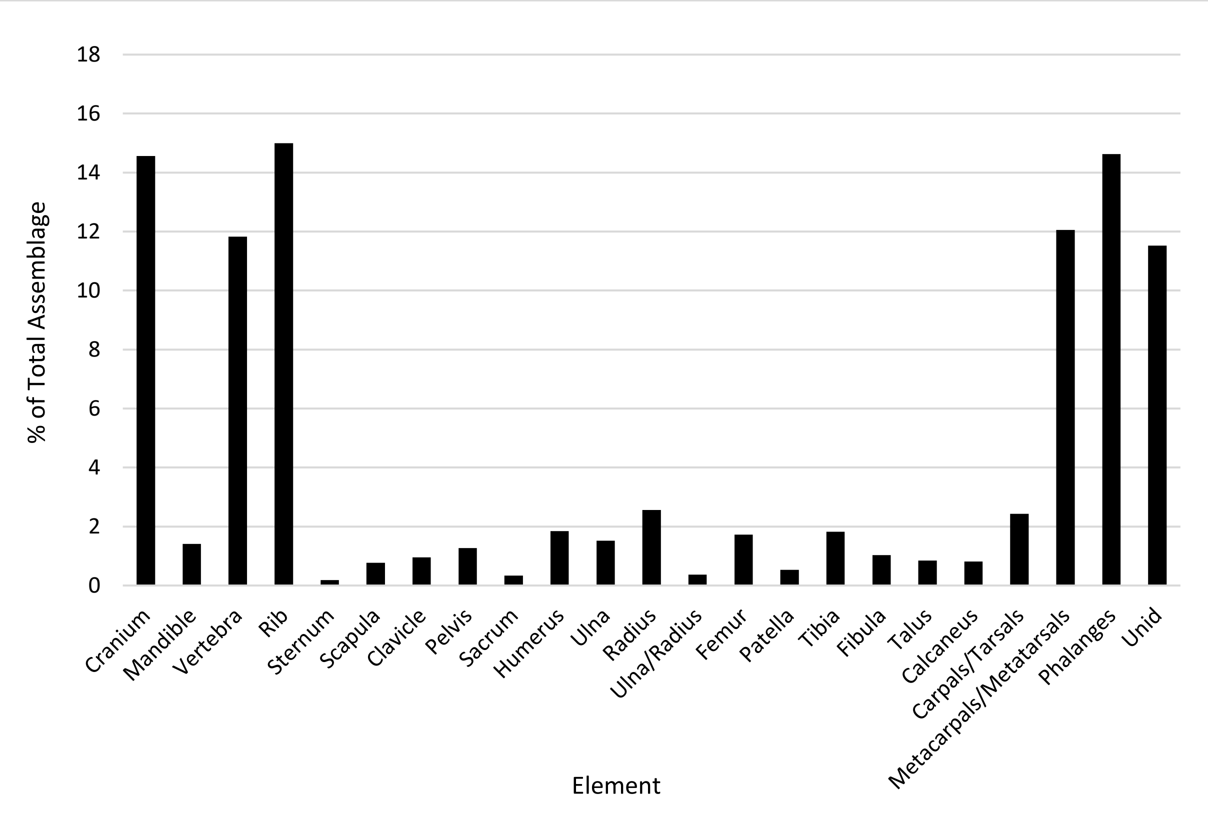


Figure 4.5: Frequency of skeletal elements in the Xemxija assemblage (calculated from Pike 1971b).

[15] The UCL accession report notes discrepancies in the number of bones tabulated in Pike's (1971b) publication and her laboratory notes (Whitelaw 2013). It is possible that this discrepancy refers to unidentifiable fragments, of which there were over 1000 noted in the published report.

4.3 Xagħra Circle

The Xagħra Circle is located on the southern edge of the Xagħra plateau between the Ġgantija temple, to the east, and Santa Verna, to the west. The construction of the larger of the two temples at Ġgantija is probably contemporary with the use of the Xagħra Circle rock-cut tombs (*ibid.*, 59). Remains of further temples have been identified in the surrounding landscape on Gozo, including at Xewkija (Magri 2009), Ta' Marżiena, and Borġ l-Imramma.

The Xagħra Circle complex contains two distinct burial spaces. At the southeast edge of the site is a rock-cut tomb with two chambers joined by a central shaft. These contained a series of successive interments in a commingled deposit (Malone *et al.* 1995). This tomb was originally thought to date to the Żebbuġ phase, on the basis of characteristic incised ceramics and a statue menhir.[16] Radiocarbon dates have recently substantially revised this, indicating the curation of material culture through to the Ġgantija period (Malone *et al.* 2019). Much of the internal space of the Circle is dominated by the hypogeum, comprising interconnecting niches carved from the limestone (Figure 4.6). The hypogeum was principally used during the Tarxien phase. Monumentalisation of the Circle with an enclosing megalithic wall, incorporating upright monoliths marking the entrance, may also date to this phase (Bonello 1996). Aligned with the entrance monolith is a threshold of megalithic paving slabs leading to the hypogeum complex. The hypogeum includes architecturally distinct zones within the East and West Caves, joined by a central area (the Shrine) containing megalithic furnishings. Human remains were clustered throughout the hypogeum, in most cases fragmented and commingled with animal remains and material culture.

Careful excavation enabled spatial analysis of *in situ* deposits of skeletal remains and material culture for the first time in the Maltese islands. The assemblage of small finds from the Circle is of great importance; the site contains one third of all figurative material recorded from prehistoric contexts on Malta, as well as the first examples of imported Piano-Quartara ceramics (Malone, Bonanno *et al.* 2009, 219–220). Ground and polished stone axes and axe pendants indicate long-ranging exchange networks, with likely sources in north-east Sicily, the Calabria-Basilicata region of southern Italy, and further afield in the western Alps of northern Italy (*ibid.*, 253). Although chert and flint artefacts were relatively rare, petrographic analysis has identified a range of sources, including local Maltese outcrops, outcrops in East and West Sicily, as well as material likely originating further afield (Chatzimpaloglou 2019). Furthermore, there are indications of changing depositional trends of artefacts. From the large

[16] Only one other example of a menhir with carved face is documented, from the rock-cut tombs at Ta' Trapna iz-Żgħira, Żebbuġ (Baldacchino and Evans 1954, Malone, Bonanno *et al.* 2009, 282).

assemblage (~1000) of beads and pendants, there is a proportionately higher representation of Żebbuġ material, perhaps suggesting more individuals deposited with personal ornaments in earlier phases (Malone, Bonanno *et al.* 2009, 266). In Tarxien contexts, the projected total number of carinated bowls (which may have contained food and drink offerings), accords with the lowest MNI estimate (Malone, Bonanno *et al.* 2009, 233).

Figure 4.6: View of the Xagħra Circle from the southwest, directly overlooking the Shrine with the East Cave to the right, and West Cave to the left (photo from BRX archive).

The faunal assemblage (c. 7000 fragments) comprised predominantly sheep/goat bones, followed by cow, pig and a small number of dog, mouse, frog, bird and cat remains, with a notable absence of marine and wild species (Stoddart, Barber *et al.* 2009, 330–332). The bones of domesticates were highly fragmentary due to extensive processing for marrow extraction, a pattern borne out at contemporary settlements (F. McCormick pers. comm). Sheep remains are dominated by torso and residual elements; in contrast, loose teeth and skull fragments predominate for cows, perhaps reflecting their rarity in the islands and the symbolic importance of bucrania. Some deposits evidence a high number of cranial and foot bones, possibly the remains of hides used as burial shrouds (Stoddart, Barber *et al.* 2009, 335).

During the succeeding Tarxien Cemetery phase, fragments of human bone alongside stone offering bowls at the eastern edge of the site may provide evidence for small-scale deposition (Cutajar *et al.* 2009, 215). Overall, however, occupation was largely domestic and many inner cave systems were abandoned. Deposits were focussed on the cave approach and in the collapsed roofs of the North and East Caves (Stoddart, Hardy *et al.* 2009, 88). There is some further evidence for occupation during the following Borġ in-Nadur period, at the southern edge of the site (*ibid.*, 90).

4.3.1 Chronology

To date, 103 radiocarbon dates predominantly from human tissue have been obtained for the Xagħra Circle[17], with satisfactory collagen yields from 98 of these (Malone *et al.* 2019). At the Circle, most samples have been obtained from bone fragments and loose teeth. Radiocarbon dating by the 'Times of Their Lives' project targeted primary interments, but where articulations could not be identified, stratigraphy was used to constrain dates from samples in sequences of deposits (Malone *et al.* 2019). In the case of disarticulated remains, radiocarbon dating is unable to reveal the timing of secondary deposition but, given the extent of manipulation of the human bone, they are instead modelled as belonging to earlier funerary use of the site (*ibid.*).

Chronological modelling identified three main phases of activity (Figure 4.7; Malone *et al.* 2019). During the Żebbuġ, deposition was small-scale and restricted to niches within the hypogeum. The only radiocarbon date for this period comes from context (595) in the East Cave (OxA-3572, 5380±70 BP) and is excluded from Bayesian analyses as it suggests much of the early burial deposit was displaced (Malone *et al.* 2019). The rock-cut tomb dates to the Ġgantija period, with deposition initiated between 3640–3500 cal BC (73% probability), for a duration of 170–505 years (95% probability). The hiatus between the end of deposition in the rock-cut tomb and the start of activity in the hypogeum lasted 160–425 years (95% probability). Surface use in the hypogeum and activity in the Shrine area date to 2975–2870 cal BC (95% probability) and deposition in the hypogeum began between 2945–2898 cal BC (95% probability). The North bone pit was constructed just after, from 2880–2715 cal BC, and used for 45–275 years (95% probability). Deposition in the hypogeum lasted between 515–655 years, during which peaks and troughs can be detected (Figure 4.8). Density analysis of the radiocarbon dates illustrates a few centuries of steady deposition followed by a sharp peak around 2600–2500 cal BC. This intensive phase of deposition relates to the mid-upper levels of the Shrine (see §4.3.3.3) and the Display zone (see §4.3.3.4). Deposition then declined steadily over a few generations, ending between 2403 and 2300 cal BC (95% probability).

[17] Of this total, two were from animal tissue. Samples were taken from bone and dentine, with recent samples only taken from dentine due to a notably higher success rate and greater collagen preservation.

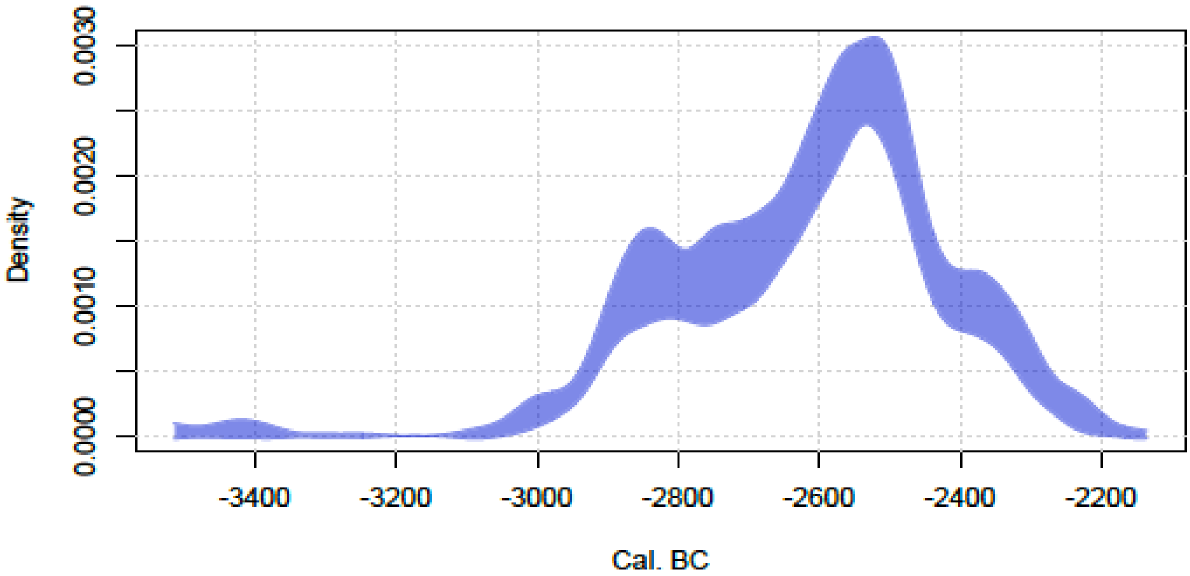


Figure 4.7: Summed radiocarbon probabilities for the Xagħra Circle (McLaughlin, Reimer and Malone forthcoming). Reproduced with the permission of Rowan McLaughlin.

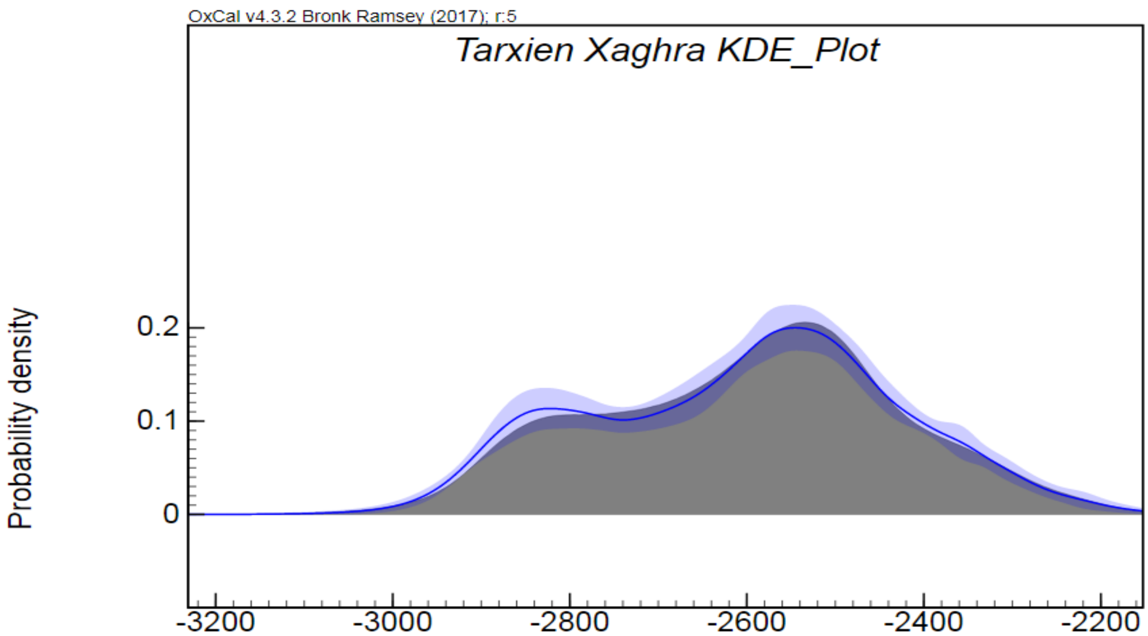


Figure 4.8: Probability analysis of activity density at the Xagħra Circle (source data in McLaughlin 2018). Reproduced with the permission of Rowan McLaughlin.

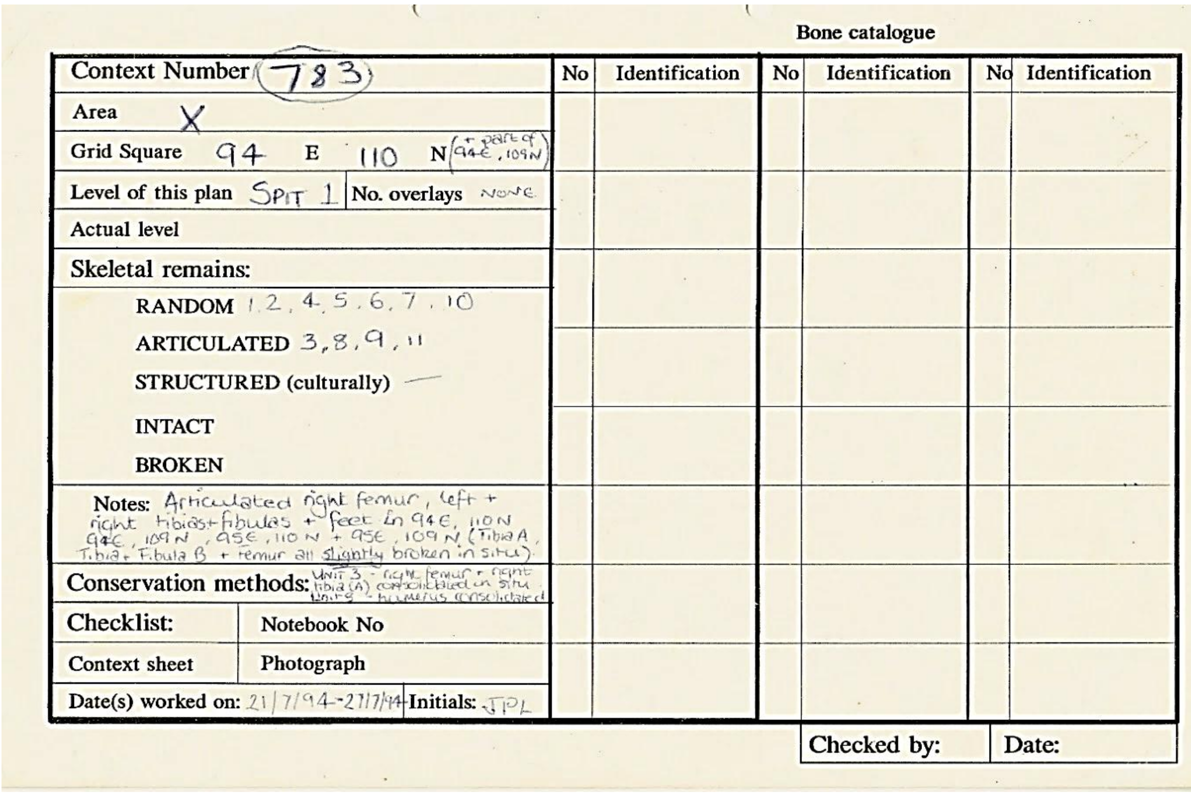
4.3.2 Excavation

The first excavations at the Circle were carried out in 1826 by Colonel Otto Bayer, the Lieutenant Governor of Gozo (Malone, Stoddart, Bonanno *et al.* 2009). That Bayer excavated intact burial deposits is described in literary accounts by some contemporary visitors to the Circle (Attard Tabone 1999, 173–174). The excavation was ended abruptly and remains unpublished; evidence survives in the form of a watercolour painting by Charles de Brocktorff (Figure 4.9). Bayer's trench was located mostly within the limits of the West Cave, to a depth just over 2 m below the modern surface, disturbing the upper levels of the deposit (Stoddart, Hardy *et al.* 2009, 90–91).

Figure 4.9: Watercolour painting by Charles Frederick de Brocktorff of the excavation by Bayer, viewed from the west. Reproduced with the permission of The National Library of Malta.

The external megalithic wall was mostly destroyed following Bayer's excavation and the location of the site was forgotten. It was located again in the mid-1960s, under heavy vegetation, by Joseph Attard Tabone (Malone, Stoddart, Bonanno *et al.* 2009, 5; Trump 2002, 176). In the mid-1980s, the Xagħra Circle was recognised to be under imminent threat from development (Malone, Stoddart, Bonanno *et al.* 2009). The Cambridge Gozo Project was initiated in 1985 as a collaboration between the Universities of Malta and Cambridge and the Museums Department of Malta, to investigate Temple period settlement and mortuary evidence (Malone, Stoddart, Bonanno *et al.* 2009, 7). Geophysical survey and excavation of the Circle was carried out for eight field seasons from 1987–1994 by a large team of archaeologists, volunteers and students over seven years (Malone *et al.* 2009, xxiii–xxvii). The archaeological deposits were recorded in detail alongside environmental sampling (Schembri *et al.* 2009) and radiocarbon dating (Malone, Stoddart and Cook 2009). Several areas of the hypogeum are still not fully excavated; intact deposits remain in both the East and West Caves and the hypogeum may extend further than the excavation limits.

The human remains were excavated in 1x1 m grids, with the stratigraphy subdivided into spits and each drawn to scale (Malone *et al.* 2009). All deposits were sieved, resulting in almost 100% recovery. Auditory ossicles, cartilage and involucra were recovered from contexts throughout the Circle (Duhig 1996; Stoddart, Barber *et al.* 2009, 328). Each 1 m^2 grid was recorded on an individual sheet alongside a scale drawing and the ‘bone catalogue’ on which gross areas of dense bone were noted and the largest and articulating elements identified (Figures 4.10–11). In total, an estimated 220,000 fragments of human bone were excavated, 19% of which (n=40,540) could not be identified to element (Stoddart, Barber *et al.* 2009, 317). The majority (n=190,774) are Tarxien in date, from 298 contexts. Of the remainder, 10,967 fragments were thought to be Żebbuġ in date, although considering recent radiocarbon dating, they are likely from predominantly Ġgantija deposits. Approximately only 2% of primary interments remained intact and articulated.


Bone catalogue

Context Number	783
Area	X
Grid Square	94 E 110 N (+ part of 94E, 109N)
Level of this plan	Spit 1
No. overlays	None
Actual level	

Skeletal remains:

RANDOM 1, 2, 4, 5, 6, 7, 10

ARTICULATED 3, 8, 9, 11

STRUCTURED (culturally) —

INTACT

BROKEN

Notes: Articulated right femur, left + right tibias + fibulas + feet in 94E, 110N 94E, 109N, 95E, 110N + 95E, 109N (Tibia A, Tibia + Fibula B + femur all slightly broken in situ).

Conservation methods: Unit 3 - right femur + right tibia (A) consolidated in situ. Unit 9 - humerus consolidated

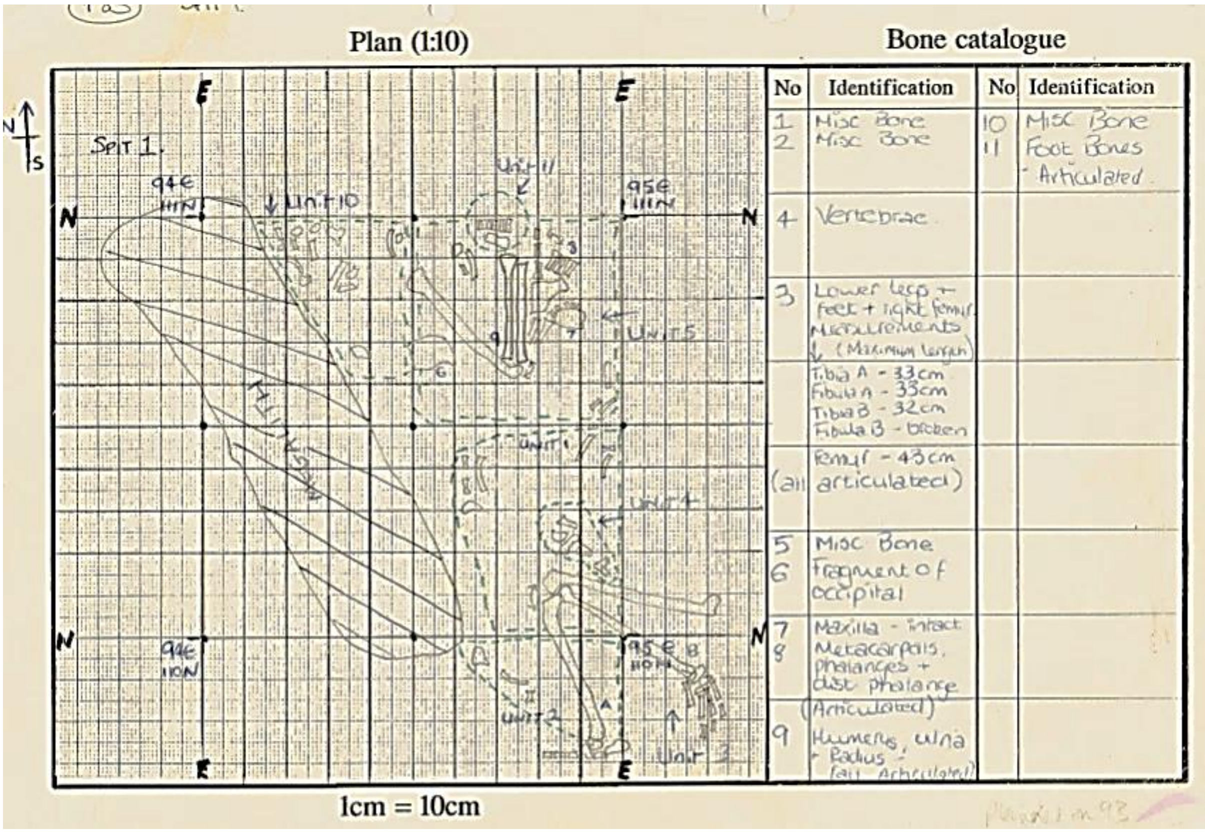
Checklist:	Notebook No
Context sheet	Photograph

Date(s) worked on: 21/7/94–27/7/94 Initials: JPL

No	Identification	No	Identification	No	Identification

Checked by: Date:

Figure 4.10: First page of recording sheet for (783) 94E/110N Spit 1 1994 (spit 2 overall) deposit described as both ‘random’ and ‘articulated’ (from BRX archive).



Bone catalogue

No	Identification	No	Identification
1	Misc Bone	10	Misc Bone
2	Misc Bone	11	Foot Bones - Articulated
4	Vertebrae		
3	Lower legs + feet + right femur. Measurements (Maximum length) Tibia A - 33cm Fibula A - 33cm Tibia B - 32cm Fibula B - broken Femur - 43cm (all articulated)		
5	Misc Bone		
6	Fragment of occipital		
7	Maxilla - intact		
8	Metacarpals, phalanges + dist. phalange (Articulated)		
9	Humerus, ulna + Radius (all Articulated)		

Figure 4.11: Second page of recording sheet for (783) 94E/110N Spit 1 1994 (spit 2 overall). Bone numbers are labelled on the scale drawing and identified in the bone catalogue (from BRX archive).

4.3.3 Overview of contexts containing human remains

The internal layout of the Circle is complex, containing distinct burial spaces demarcated by megalithic structures (Figure 4.12). A brief overview of each of the main areas is provided below, highlighting the key contexts containing human remains. For summary contextual data, including the NISP, MNI, FI[18], and notable features of the burial deposit, see Appendix 3.1.

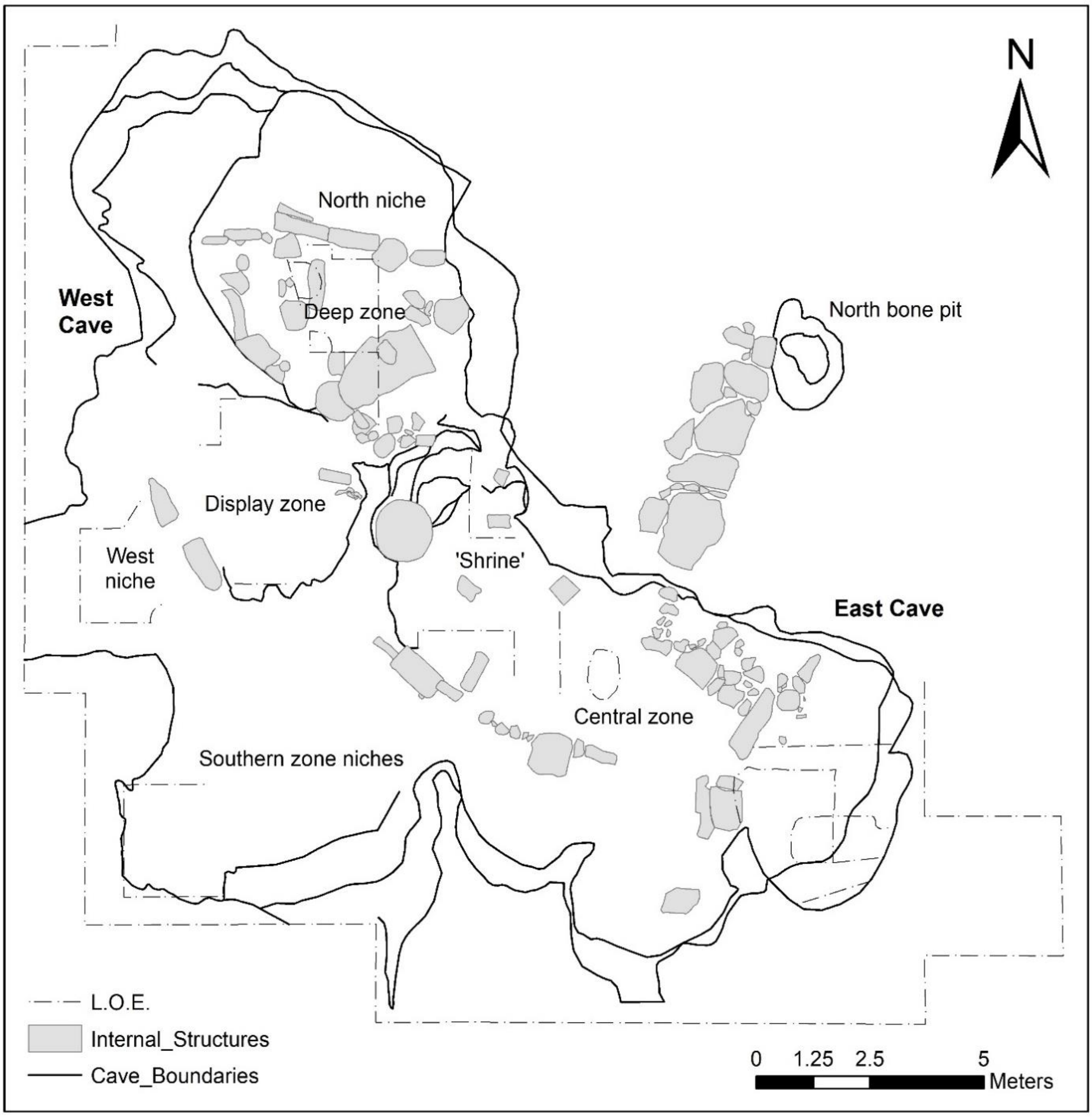


Figure 4.12: Plan of the Xagħra Circle hypogeum, excluding the rock-cut tomb (produced by author from FRAGSUS data).

[18] The FI has been used to represent the level of fragmentation within each context, calculated by dividing the NISP by MNI. The methodology for this calculation is potentially problematic (Marshall and Pilgram 1993), but it provides a useful marker of fragmentation in contexts with large samples (Stoddart, Barber, *et al.* 2009, 316).

4.3.3.1 Rock-cut tomb

The rock-cut tomb contained two chambers flanking a central shaft (Figure 4.13), and was in use from 3640–3500 cal BC (73% probability), for a duration of 170–505 years (95% probability) (Malone *et al.* 2019). During this time, at least 54 adults and 11 nonadults were interred, with at least 34 adults and 7–14 nonadults in the West chamber and 20 adults and 4 nonadults in the East chamber (Duhig in Malone *et al.* 1995, 339).[19] Large artefacts (possibly closing deposits) were placed at the entrance of both chambers, with the carved stone menhir in the West chamber, and a large triton shell placed in a Żebbuġ jar in the East chamber (Malone, Stoddart, Trump *et al.* 2009, 100). Animal remains accompanied the human bone, with 93 fragments recovered from the West chamber and 46 from the East (Barber in Malone *et al.* 1995, 341). Most were identified as sheep/goat, with a small number of pig and cow bones present. Interestingly, most of the sheep/goat remains from the West chamber are attributed to the skull and mandible (*ibid.*).

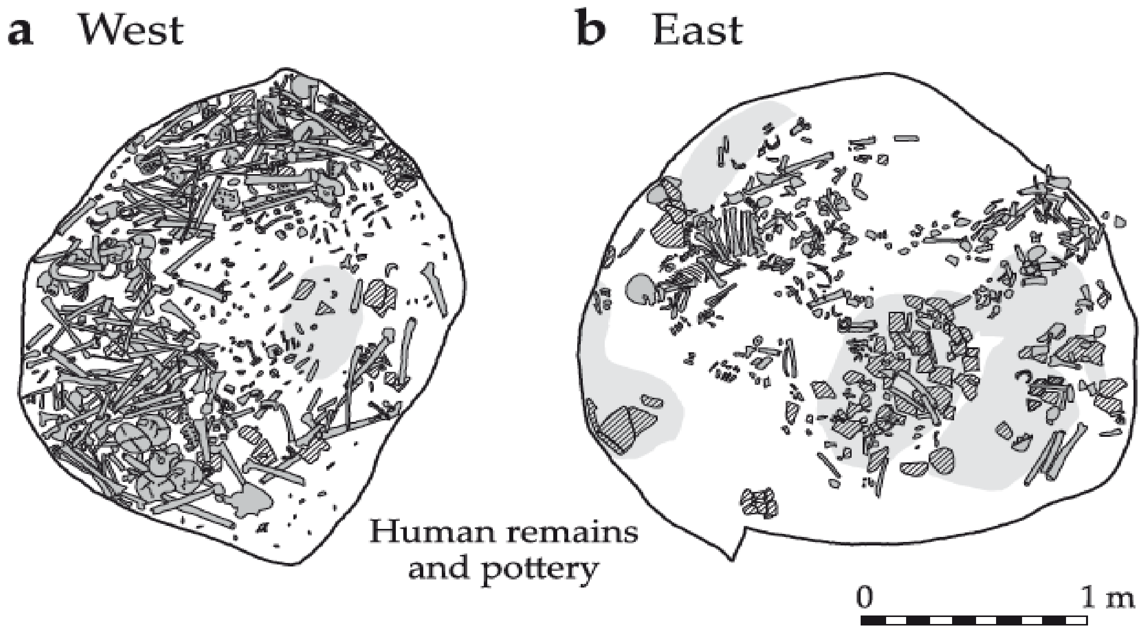


Figure 4.13: Plan of the rock-cut tomb chambers, with grey patches representing ochre and shaded areas indicating ceramics (Malone, Stoddart, Trump *et al.* 2009, 101). Reproduced with the permission of Corinne Duhig.

The West chamber contained a large deposit of human bone in one main context (276), with some bone mixed in the upper level (274). Beneath the entrance, the burial deposit had been later excavated to the bedrock to inter a single individual, associated with the only Ġgantija phase pottery (Malone *et al.* 1995, 310). A cache of crania was placed at the southern end of the chamber,[20] and most bones had been shifted to the edges of the chamber. Remains at the

[19] Although high fragmentation was noted and has certainly suppressed this number (Duhig in Malone *et al.* 1995, 339).
[20] Only one complete cranium was preserved, belonging to a mature female (Duhig in Malone *et al.* 1995, 339).

top of the deposit were commingled, raising questions as to the nature of secondary deposition (Malone, Stoddart, Trump *et al.* 2009, 102). This chamber contained a considerable number of artefacts, including beads, shells, pendants, lithics and pottery. A cache at the rear base of the tomb contained one axe, two miniature axes, two complete pots and four pseudo-anthropomorphic bone pendants, perhaps representing a foundation deposit (Malone *et al.* 1995, 310).

The East chamber was stratigraphically more complex. The basal layer consisted of three deposits: (326), (328c) and (334/326b), the middle layer similarly consisted of distinct contexts (328a, 328b, 335), (275) and (326) and, finally, the upper deposit (272) comprised very few bones and artefacts. These likely represent episodes of re-opening and re-use, but the condition of the skeletal remains indicates less disturbance than in the West chamber (Malone, Stoddart, Trump *et al.* 2009, 100). More elements were preserved in articulation or association. A contracted male skeleton (aged 22–43 years old) was placed near the entrance, possibly representing the last interment in the chamber (Duhig in Malone *et al.* 1995, 340). Two bone groups were located nearby: a right lower arm, and fragments of an adult, adolescent and child that may have been deposited late in the sequence. The lower arm was separated from the hand at the wrist, although the hand bones were in articulation (Stoddart, Barber *et al.* 2009, 319). Overall, a smaller group of individuals were deposited in this chamber and the skeletal remains were less disturbed and fragmented. They were associated with a substantial number of artefacts, including v-perforated buttons, pseudo-anthropomorphic bone pendants, lithics, greenstone and other polished stone axes and pendants, shell pendants and beads (Malone *et al.* 1995). This chamber also contained a greater number of beads (388) and bone pendants (19) than the West chamber (from which 33 beads and 8 pendants were found) (Malone *et al.* 1995, 330, 335).

4.3.3.2 North bone pit

The North bone pit, to the east of the Threshold, was excavated in eight layers (totalling 39 levels), comprising seven distinct contexts (Figure 4.14). According to site records, the pit was not fully excavated, and further bones were visible at the base of level 39. Radiocarbon dating places use of this pit from 2880–2715 cal BC, for between 45–275 years (95% probability) (Malone *et al.* 2019). The lowest levels (37–39) contained a small group of disarticulated bones in a deep pocket in the southeast corner, overlying which was placed an articulated, adult male inhumation. Within this context (799), animal remains mostly consisted of sheep/goat vertebrae and foot bones, ceramics spanned Żebbuġ to Tarxien forms, and some worked chert was present. The next major deposit comprised 3 layers, with (697) at the lowest level, (669) in the

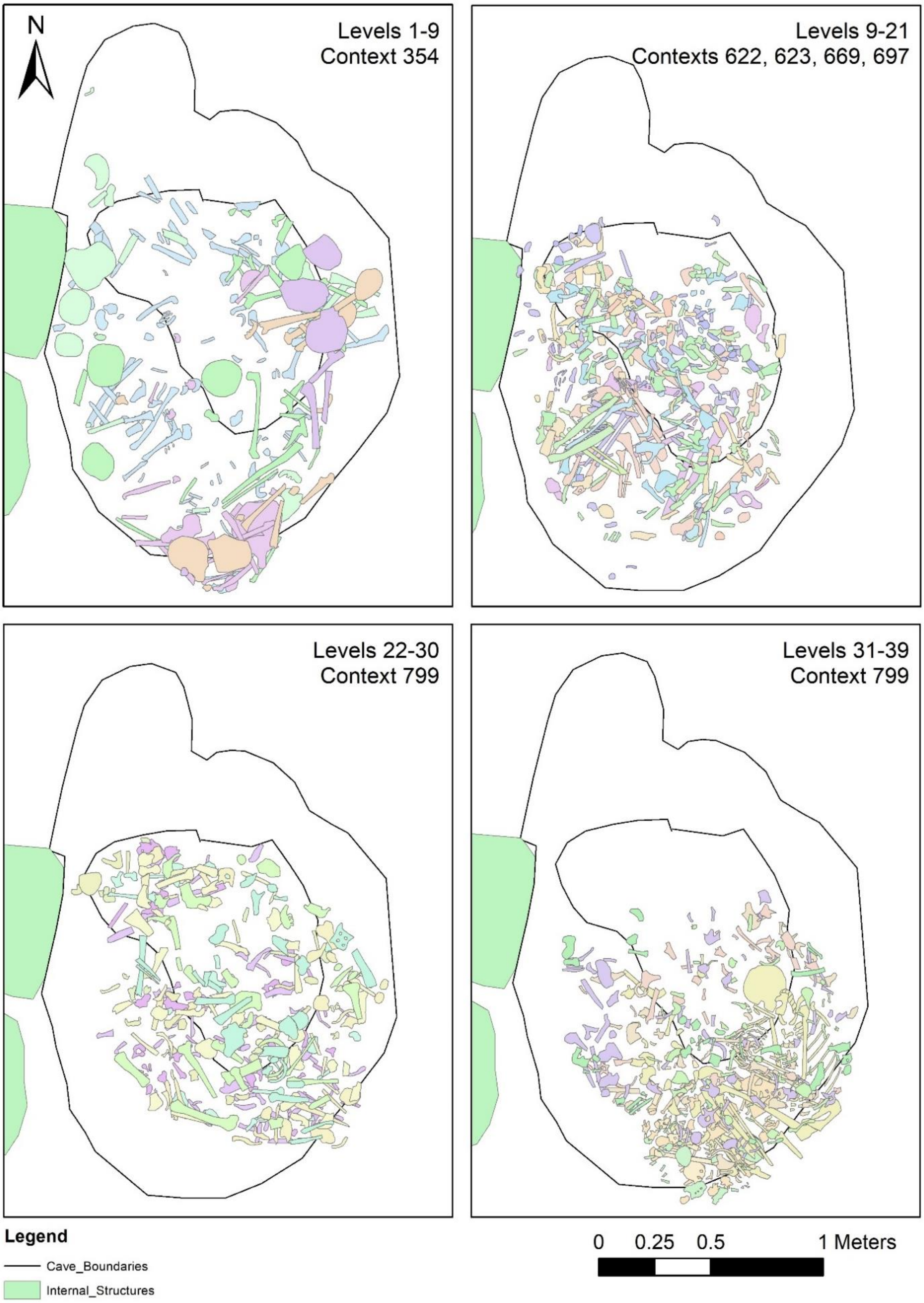


Figure 4.14: Depositional sequence in the North bone pit, with remains from each level displayed in a different colour (excavation plans digitised in ArcGIS by author).

middle and (622) sealing these. Within these contexts a small number of chert flakes and shell beads were found, alongside a single Żebbuġ sherd and faunal remains mostly comprising sheep/goat (with small numbers of pig and cow). Above this, (623) contained a small number of human bones. The topmost context (354) was densely packed, with many crania (MNI=22), and more material culture and faunal remains than the lower levels.

Crania predominate throughout the pit, and small bones are under-represented. Additionally, previous radiocarbon dating indicates (through median dates) that some bones from stratigraphically later contexts are in fact older and were curated (Stoddart, Malone, *et al.* 2009, 117).

4.3.3.3 Shrine

The Shrine is located immediately in front of the rock-cut steps within the centre of the hypogeum (see Figure 4.12). This area contained numerous *in situ* megalithic furnishings, including a large stone bowl, external and internal stone screens (Figures 4.15–16). The depositional sequence in the Shrine comprises one main bone-rich deposit (960) which covers a series of stacked interments above the bedrock (Stoddart, Malone *et al.* 2009, 140). Earliest use of the Shrine is dated to 2895–2855 (74% probability) (Malone *et al.* 2019).

The interments at the base of the sequence, in (1328), were placed in a hollow cut in the bedrock. This context contained the remains of four male individuals (A, B, C, D), and the residual elements of at least another two individuals whose skulls, torsos and long bones seem to have been later moved (Stoddart, Malone *et al.* 2009, 142). Individuals A, B and C are interpreted as 'bundle burials' as their limbs were tightly contracted. Individual A was covered in red ochre while individuals B and C were notably stained black. Disturbance is evident as the lower limbs of all individuals are either missing or displaced. Individual D is possibly later in date, consisting of a partly articulated torso and skull (*ibid.*). This deposit was covered by a less disturbed pink silt layer (1268). The lowest level of this context contained one almost fully preserved articulated flexed male, orientated northeast-southwest and placed above the stacked burials in (1328). Surrounding this individual were elements in varying levels of articulation. Covering the male individual was a female adult, contorted to fit into a small pit such that the legs were no longer articulated with the pelvis (*ibid.*); possibly suggesting partial decomposition before interment. A further intact inhumation of a mature female with an exceptional cowrie-shell headdress, covered in red ochre, was preserved (Stoddart, Malone *et al.* 2009, 145). The rest of this deposit was filled with a substantial amount of skeletal remains of all ages and both sexes (*ibid.*). Context (1268) contained three greenstone pendants (and a fragment of another), stone beads, carved bones, and a single sheep radius (*ibid.*). These lower levels accumulated over an estimated 315–395 years (75% probability) (Malone *et al.* 2019).

Context (1206) covered these deposits; the southwest limits comprised a zone of partly articulated remains of female and nonadult individuals. At an upper level, next to the stone bowl, were further juvenile and neonatal remains, although with less evidence of articulation (*ibid.*). A greenstone pendant (and fragments of another four) were found, alongside fragments of a large standing stone statue predominantly distributed in the Display zone, beads, a fossil tooth, and marine shells. This context is dated from 2665−2540 cal BC to 2555−2490 cal BC (95% probability) (Malone *et al.* 2019). Below (1206) was a shallow pit (1216), containing the remains of a male and an infant (Stoddart, Malone *et al.* 2009, 149).

The most bone-rich layer (960) in this area comprised mostly disarticulated remains and dates toward the end of the hypogeum's use, from 2530−2475 cal BC to 2460−2355 cal BC (95% probability) (Malone *et al.* 2019). Only one intact male individual was preserved, described as a contracted 'bundle burial' (Stoddart, Malone *et al.* 2009, 149). Context (960) contained a significant amount of cultural material, including a greenstone pendant and fragments, another fragment of the standing statue, a shell scoop and pendant, 20 beads, three miniature Tarxien cups, worked chert, Żebbuġ ceramics and a pseudo-anthropmorphic pendant (*ibid.*). The placement of the stone bowl was likely contemporary with the rearrangement of the internal layout of the Shrine and the deposition of (960). The bowl was then filled with human remains in a silty deposit (Stoddart, Malone *et al.* 2009, 150). The southern external stone screen (665) was erected after the lowest burials were interred and sits within the bone deposits of (960) (Stoddart, Malone, *et al.* 2009, 153).

The upper sequence of the Shrine (831) partly cut into (960) and contained exceptional figurines, including a cache of nine stone figures and a twin-seated figure which was found lying face-down (Stoddart, Malone *et al.* 2009, 155). These may represent a deliberate closing deposit, but also could have fallen from structures which collapsed toward the end of the site's use (*ibid.*). Directly beneath the cache of nine figurines was the primary interment of a foetus. Further material included beads, worked chert and a Tarxien cup filled with ochre. Covering both (960) and (783) in the Display zone was an ochre stained deposit (1024) containing small amounts of bone (Stoddart, Malone *et al.* 2009, 158).

Figure 4.15: The stone bowl (841) before excavation, viewed from the west (photo from BRX archive).

Figure 4.16: The southern screen viewed from the south (photo from BRX archive).

4.3.3.4 Display zone and West niche

The Display zone is entered through the Shrine and set in a depression in the bedrock, about 50 cm deep, which contained the largest single context (783) of human remains (53,139 identified fragments) (Figure 4.17). Deposition in this area dates to the peak of the hypogeum's use, initiated between 2585−2520 (93% probability) and ending 2420−2305 (95% probability), for a duration of 130–265 years (95% probability) (Malone *et al.* 2019). Bayesian modelling shows that interments in this space built up relatively rapidly. Primary deposition appears to have been the dominant practice here, with corpses left to decay before elements were rearranged (Stoddart, Malone *et al.* 2009, 159). Five individuals were preserved mostly intact on the edges of the deposit and at low levels in the stratigraphy (*ibid.*). At the western edge of this zone were two megaliths leading into the West niche. Upper levels of (783) covered this niche and a series of earlier contexts. The distribution of skeletal remains within the lower levels of the Display zone indicated that a corridor originally existed, leading from the Shrine through to the West niche (*ibid.*). In the upper levels, maintenance of this corridor was abandoned, and bone was densely strewn across the whole area, suggesting that the West niche was filled by this time.

The Display zone contained numerous faunal remains, principally sheep/goat, alongside mouse, bird, pig, cow, and cat (Stoddart, Malone *et al.* 2009, 159). This area is notable for the large number of ceramic figurines and figurine fragments, including fragments of a large stone standing skirted figure (estimated at >60 cm tall) which were distributed mostly in (783), the West niche and in surrounding contexts (Malone, Bonanno *et al.* 2009, 289). The excavated fragments do not allow for a full reconstruction (the head is conspicuously missing), suggesting further pieces remain unexcavated or the full figurine was not deposited in the hypogeum. Another 20 ceramic figurines and fragments were deposited in (783), as well as a ceramic snail and five heads carved on sheep phalanges (Stoddart, Malone *et al.* 2009, 159). Further cultural material included a greenstone pendant, polished tooth, shells, beads, and worked chert and bone.

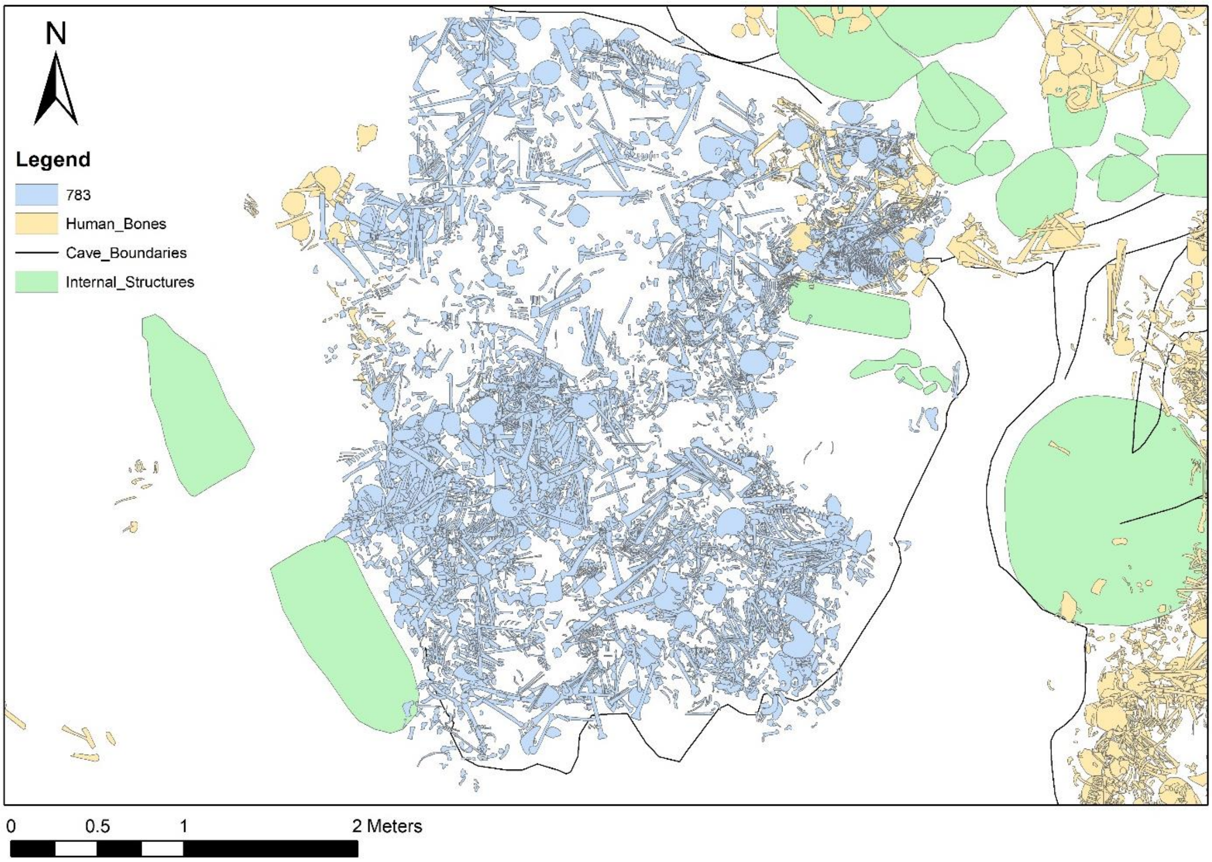


Figure 4.17: All planned human remains from context (783), extracted from the full set of digitised human bone and highlighted in blue (excavation plans digitised in ArcGIS by author).

4.3.3.5 Deep zone

The Deep zone is located to the northeast of the Display zone, bordered to the north by a line of Coralline and Globigerina megaliths (see Figure 4.12). This area was the deepest excavated zone within the hypogeum, extending >5 m below ground surface (Stoddart, Malone *et al.* 2009, 133). A complex series of cut, fill and pit deposits characterises the lower levels. The densest deposit (951), at 30 cm deep, overlay three smaller fills (1111, 1200, 1204). Little material culture was present in these fills, with only some sheep/goat and pig bones and teeth, a few ceramic sherds and shell beads (Stoddart, Malone *et al.* 2009, 137). In contrast, the larger deposits of (1144) and (951) contained a significant amount of cultural material. Context (1144) contained 98 stone and shell beads, a greenstone pendant, some chert flakes, and sheep/goat feet and rear limb bones (Stoddart, Malone *et al.* 2009, 136). Within (951) was a substantial number of Żebbuġ to Tarxien ceramics as well as sherds of imported Sant'Ippolito ware, a broken torso fragment of a terracotta figurine, chert tools and flakes, a ceramic bead and Coralline pounder, although animal bone was rare (Stoddart, Malone *et al.* 2009, 137).

In this area, many contexts appear to be residual, with material culture from Żebbuġ, Saflieni and Ġgantija phases. Contexts (1144) and (951) contained numerous disarticulated crania, often in association with megaliths (Stoddart, Malone *et al.* 2009, 136). Some crania contained a white silt, contrasting the brown clay-silt of the burial deposit (*ibid.*). Some deposits seem to be primary and perhaps mostly intact (1234, 1237), while others are residual, suggesting the removal of bone from primary interments (1225, 1144).

4.3.3.6 North niche

The North niche is located at the northernmost edge of the West Cave, fronted by a broken Globigerina megalith (877) which may have originally stood upright, held in place by another megalith (1115). Behind this was the second-largest deposit of human remains, and the largest deposit of animal bone in context (845) (Stoddart, Malone *et al.* 2009, 126). (845) is suggested to have predominantly held primary depositions, although no articulations were observed due to post-depositional disturbance (Stoddart, Malone *et al.* 2009, 133). Cultural material included worked chert, shell and ceramic beads, a greenstone pendant, bone point, ceramic figurine head and predominantly Tarxien ceramics (*ibid.*). Another deposit, context (863) was stratigraphically parallel but located by the entrance to the North cave (*ibid*.). A series of contexts with small numbers of human bone overlaid these.

4.3.3.7 East Cave

The East Cave would originally have been accessed through arches at the eastern end of the West Cave system but, along with the cave roof, these collapsed toward the end of the site's use and were propped up with megalith (553) (Stoddart, Malone *et al.* 2009, 163). The East Cave was not fully excavated and *in situ* deposits remain. From radiocarbon dates on excavated remains, the start of deposition in this area is placed between 2710–2535 cal BC (64% probability), ending 2490–2350 cal BC (95% probability), with a duration of 100–460 years (95% probability) (Malone *et al.* 2019). On present evidence, it appears as though the East Cave was in use prior to the peak phase of activity and continued to receive interments until the hypogeum was abandoned.

A series of complex fills, some containing human bone, connect this area to the Shrine, leading to a substantial 3x3 m burial deposit (1241) in the southeast corner (Stoddart, Malone *et al.* 2009, 167–169). The lower levels contained several articulated individuals, including a male over which a female had been placed in the same position (Stoddart, Malone *et al.* 2009, 169, 172). Two further nearly complete individuals and one disturbed individual were also identified (Stoddart, Malone *et al.* 2009, 172). At the western edge, a highly disarticulated and commingled deposit was found (Figure 4.18). Within the middle level were two pits, with the east pit containing crania and other disarticulated remains, and the west predominantly holding disarticulated bones. Faunal remains in (1241) comprised mostly sheep/goat feet and vertebrae, alongside some upper limb and skull fragments (Stoddart, Malone *et al.* 2009, 169). Ceramics included some weathered Żebbuġ sherds, a Saflieni sherd and much Tarxien material, alongside two terracotta pendants depicting female torsos (the only of their kind on the islands) deposited with a fragmented stone figurine head (*ibid.*). The roof collapse deposit (1281) covered most of the East Cave sequence, overlying which was a complex series of deposits with a high number of nonadult remains (Stoddart, Malone *et al.* 2009, 173).

The Southwest niche in the East Cave contained one of the largest and most stratigraphically secure deposits (595), overlying levels containing substantial numbers of Żebbuġ ceramics (Malone, Stoddart, Trump *et al.* 2009, 103). The human remains in this area had been sealed by roof collapse, overlying which were ceramics dating from the Żebbuġ to Tarxien phases, suggesting later re-use of this niche. This context contained many nonadult remains (44% of the MNI) and residual elements (*ibid.)*.

Alongside the North bone pit, the central pits in the roof of the East Cave represent the only other areas of surface activity during the Tarxien phase (Malone *et al.* 2019). Dates from one of the pits [435] place its use at 2500–2395 cal BC (71% probability), while an articulated hand from (743) in the other pit [437] dates to 2490–2305 cal BC, toward the end of burial activity at the site (95% probability) (Malone *et al.* 2019). The earliest pit (425) contained deposits (714) and (425) with Tarxien ceramics, faunal remains, worked chert and human remains. These were cut by a pit containing successive nonadult inhumations (contexts (743) and (741)) positioned above each other and facing the same direction, sealed by a layer of brown silt loam (Stoddart, Malone *et al.* 2009, 121). Further inhumations were made above these, with the individual in context (719) in the same position as those below, and another individual in an upper level, in context (436) (Stoddart, Malone *et al.* 2009, 122). The lowest three individuals were, unusually, deposited supine. The cave roof collapse caused the separation of bones from the torso and lower body of most of these individuals. The large quantity of rubble and shaped stone blocks in these deposits have led to the suggestion that it originally represented a similar space to the Shrine and may also have borne a structural relationship with the Northern bone pit, as it is immediately south of the Threshold (*ibid.*).

Figure 4.18: Contrast between articulated individuals (left) and disarticulated remains (right) in (1241) (photo from BRX archive).

4.3.4 Curation

During excavations at the Circle, human remains were temporarily stored at the Ġgantija temple site hut. At the end of the excavation, they were shipped from Malta to Southampton, UK and then transported to the Department of Archaeology, University of Bristol for further study. The assemblage was finally shipped back to Malta in 1996 to be curated and stored at the National Museum of Archaeology (NMA) in Valletta. The commencement of the FRAGSUS project in 2013 initiated further efforts to curate and catalogue the assemblage.

4.3.5 Prior analysis

The rock-cut tomb was excavated earliest and the human remains were studied by Corinne Duhig, who carefully considered taphonomic processes (Duhig in Malone *et al.* 1995; Duhig 1996). Element preservation from both chambers indicated a very different pattern than would usually be expected in the case of primary inhumation, due to the process of collective and successive deposition (Figure 4.19; Duhig in Malone *et al.* 1995). However, the high number of foot bones supports the hypothesis that many individuals were deposited as primary inhumations. Perhaps partly due to re-opening for successive depositions and continued disturbance, trabecular bone has not survived well, and elements of the axial skeleton and the pelvis are under-represented. The low number of nonadult remains from the tomb may be a result of density-mediated attrition (Duhig in Malone *et al.* 1995, 339).

Three main hypotheses for funerary practices in the rock-cut tomb were put forth; these included (1) primary deposition and clearance of earlier remains for successive interments; (2) primary inhumation elsewhere with secondary burial of ‘clean bone’ in the tomb; (3) as with (2), but with stricter timing of secondary burial practices which were not dictated by the stage of decomposition (Duhig in Malone *et al.* 1995, 341). These hypotheses are not mutually exclusive, and a mixture of funerary practices may be evident.

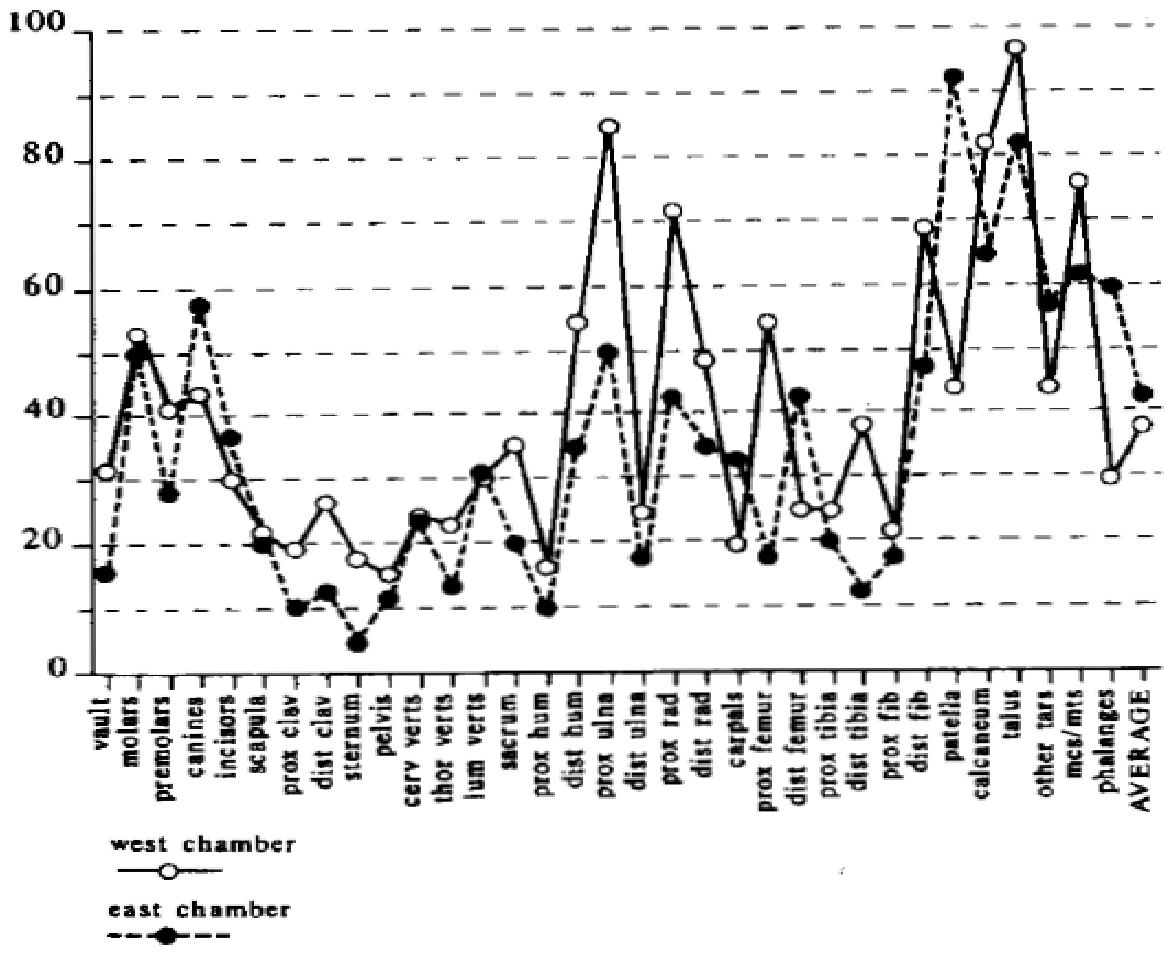


Figure 4.19: Skeletal elements from the rock-cut tomb, as % of expected. C. Duhig in C. Malone *et al.,* 1995, ‘Mortuary ritual of the 4th millennium BC Malta: the Żebbuġ period chambered tomb from the Brochtorff Circle at Xagħra (Gozo)’ in *Proceedings of the Prehistoric Society* (61), page 339, reproduced with permission.

Within the hypogeum, quantification proved challenging due to the fragmentary nature of the material. For each context, a range of the MNI was calculated (Stoddart, Barber *et al.* 2009, 321). The lowest MNI excludes age, whilst the highest MNI accounts for both aged and unaged body parts and may include some double counting. MNI was calculated using identifiable anatomical features, such as the petrous portion of the temporal bone and long bone epiphyses (Stoddart, Barber *et al.* 2009, 316). To calculate an MNI for the complete assemblage, each context was treated as temporally distinct, producing an ‘upper’ MNI of 822 based on crania (Stoddart, Barber *et al.* 2009, 319). If the false assumption is made that all deposits are contemporary, aggregation reduces the MNI to 361 (Figure 4.20; Stoddart, Barber *et al.* 2009, 321). While some earlier material is present within Tarxien layers, the upper MNI must still be viewed as a significant under-representation of the *original* burial population. Processes of both *in situ* degradation and cultural practices such as successive deposition have been demonstrated to consistently produce a severely lowered MNI (Robb 2016).

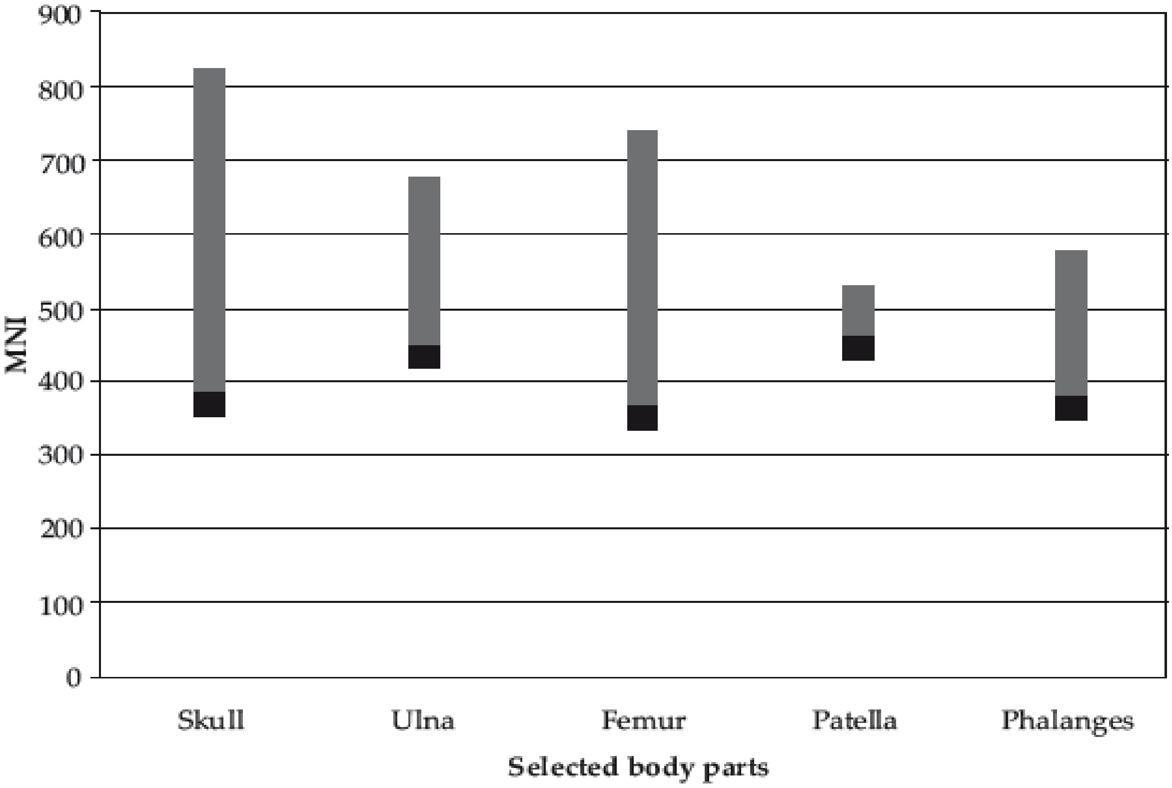


Figure 4.20: The range of MNI calculations from several elements. The lowest MNI estimate is represented by the black shaded area and combines all contexts to calculate the MNI, while the upper limit is reached through summing the MNIs from each distinct context and this range is presented in grey (Stoddart, Barber *et al.* 2009, 322). Reproduced with the permission of Caroline Malone on behalf of Geraldine Barber.

Individuals of all ages are present, but children (1–14 years) are more prevalent than neonatal, infant or adolescent individuals (Stoddart, Barber *et al.* 2009, 321). Males and females were almost equally represented (94:71), although the presence of many articulated male individuals in the Shrine area has been said to indicate their preferential deposition (Stoddart, Barber *et al.* 2009, 321). Stature across the population, estimated from articulated and disarticulated long bones, is in the range of 1.4–1.8 m. From five female individuals, adult female stature ranges from 1.4–1.6 m (mean height 1.48 m), while estimates from five adult males determines stature to range from 1.61–1.77 m (mean height 1.69 m) (Stoddart, Barber *et al.* 2009). Evidence of palaeopathological lesions and trauma was relatively low, mostly noted in the form of joint and dental disease related to habitual activities (Power, Mercieca-Spiteri, Thompson *et al.* forthcoming; Stoddart, Barber *et al.* 2009). An increase in palaeopathological lesions is evident during the Tarxien and some contexts (783, 960) show a particularly high presence and incidence rate (Stoddart, Barber *et al.* 2009, 328).

Initial taphonomic analysis revealed no cutmarks, gnawing, burning or leaching (Stoddart, Barber *et al.* 2009, 317), suggesting the site was protected from scavengers and subject to little inundation. However, the interpretation of funerary practices is not completely satisfactory, given the highly disarticulated deposits. The lack of taphonomic modifications suggests that most corpses were skeletonised before elements were redistributed, although the high number of articulated extremities (hands and feet) and vertebrae is unusual and has been noted (Parker Pearson 2012).

The primary aim of subsequent analysis has been to understand the redistribution of body parts and the relationship between contexts (Stoddart, Barber *et al.* 2009, 319). Categorising contexts according to the relative proportion of crania, long bones and residuals has revealed that several deposits—including (1268), (1206), (783), (1241), (960), and (799)—are almost ‘anatomically correct’ in their composition, despite high levels of disarticulation (Figure 4.21; Stoddart, Barber, *et al.* 2009, 320). These contexts contain particularly high numbers of skeletal remains and were used intensively during the Tarxien period, suggesting that, to some extent, these results reflect the large sample size and high resolution of data in these contexts. Conversely, some contexts contain high numbers of residual elements, crania or long bones and represent predominantly secondary deposits.

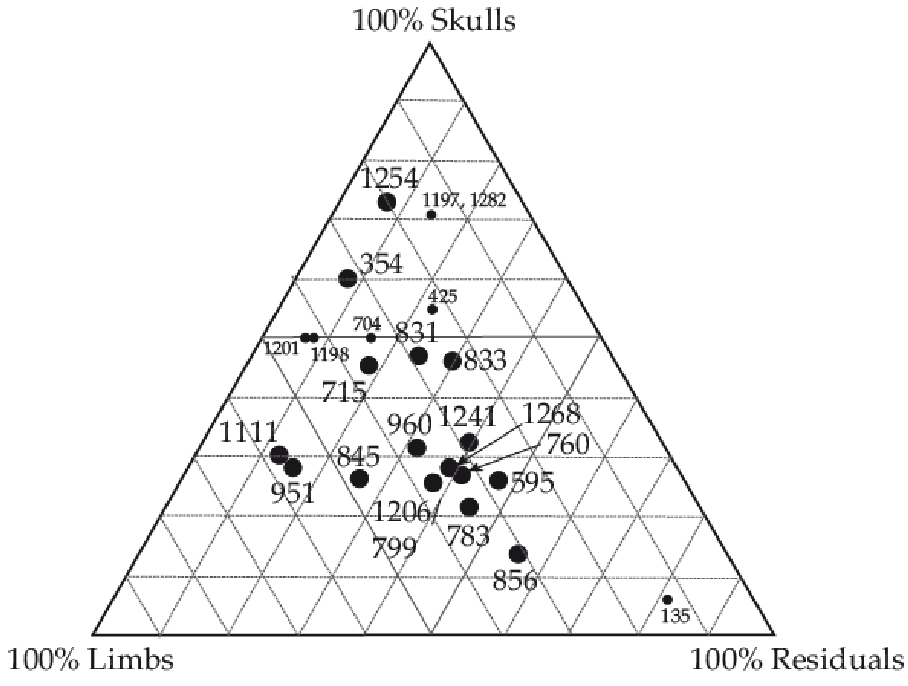


Figure 4.21: The composition of major skeletal elements in each context, with the size of each context roughly illustrated by the size of the data point (Stoddart, Barber *et al.* 2009, 320). Reproduced with the permission of Caroline Malone on behalf of Geraldine Barber.

These results comprise important analyses of an exceptionally large body of material. Yet, there are key ways in which our understanding of deposition at the Xagħra Circle could be developed through applying the methods of funerary taphonomy. Element preservation has not been studied in detail according to a range of taphonomic processes. Although burning and scavenging was borne in mind during the original analysis, overall data pertaining to the condition of the bone (relating to processes such as diagenesis and leaching), as well as bone surface preservation (revealing of erosion, abrasion and weathering) has not been recorded. These might typically be classed as 'natural' taphonomic modifiers but provide crucial information on the formation of the deposit which may also relate to cultural activity (such as exposure and re-deposition). Analysis of element presence and preservation at the level of individual zones, currently lacking, would facilitate characterisation of the extent of degradation. Significantly, relative skeletal element representation curves are only available for the rock-cut tomb. Element representation which does not account for expected totals based on the MNI within each context (such as the model presented in Figure 4.21) can be problematic. Constructing models of funerary practices accounting for both taphonomic modification and relative element representation is therefore paramount to more fully understanding the range of depositional modes at the Xagħra Circle.

Due to time and financial constraints, few excavators were trained osteologists and *in situ* analysis was often restricted to the more complete, articulated skeletons. Techniques of field anthropology (archaeothanatology) were not employed, as they had yet to become common practice outside of the French context, and methods of funerary taphonomy are likewise only recently entering standard practice. There is much to be gained from the post-excavation application of these methods. To this end, the digitised and spatially referenced excavation plans provide a significant resource. Reflecting the mixed nature of the skeletal deposits, this provides a flexible methodology to analyse both complete and fragmented remains, which will shed further light on the stage at which individuals were disarticulated post-mortem

4.4 Summary

The Xagħra Circle and Xemxija tombs present very distinct excavation and curation histories, each differently affecting the sampling strategies and analyses undertaken for this research. At both sites, most excavators were not trained osteologists. At the Xemxija tombs, bones missed during excavation were probably retrieved during sieving, but *in situ* recording was not undertaken. At the Xagħra Circle, there were varied standards of on-site recording, with only the most complete bones labelled on excavation drawings, and these may not always be accurate.

For the Xemxija assemblage, discrepancies are evident between the number of fragments identified in Pike's (1971b) published report and in her notebooks (Whitelaw 2013). The multiple episodes of unpacking and re-packing may have resulted in the loss of some remains and has led to the separation of most remains from their original bag and tomb number. The dentition was sent to Sylvia Rodgers for analysis, and the small number present in the assemblage suggests that perhaps not all were returned. Similarly, the remains from the Xagħra Circle have been analysed and relocated multiple times, and some contexts cannot be located within the NMA stores. It is unclear whether these are present but have not been labelled, or if they have become lost.

The solution to the possible biases of the Xemxija assemblage, to sample it in total, is manageable due to the size of the assemblage. The same solution cannot be applied to the Xagħra Circle assemblage; as a result, the sampling strategy is flexible and accords with the main research questions and concerns of the FRAGSUS project. The key difference between these two assemblages pertains to excavation recording. The lack of available records for the Xemxija Tombs affects quantification, as discussed in §4.2.4. Although the limitations of calculating MNI are well-known, results will be biased due to the false assumption that all remains comprise one aggregated context lacking chronological distinction.

Nevertheless, these are two of the most recently excavated Neolithic burial sites on the Maltese islands for which the human remains are available to study. To date, detailed taphonomic analysis has only been undertaken for the rock-cut tomb at the Xagħra Circle. Since this work, funerary taphonomy has become an established field of bioarchaeological research, with well-developed methods and a large body of comparative studies, which will be discussed in Chapter 5. These sites provide a unique opportunity to apply taphonomic methods on a larger scale, the results of which will significantly advance our understanding of Neolithic funerary practices on the Maltese islands.

CHAPTER FIVE

METHODS OF TAPHONOMIC ANALYSIS

5.1 Overview

As argued in Chapter 4, methods of taphonomic analysis are ideally suited to the study of commingled assemblages, providing greater understanding of the depositional environment and funerary practices. This chapter outlines the origins and development of taphonomic studies, charting their uptake in archaeology and transformation into the field of funerary taphonomy. Key factors affecting the preservation of human remains are outlined. Analytical methods are then discussed and, for each, justification is provided for the standards adopted in this research, and recording protocol is described. Statistical methods for quantifying human remains and determining modes of deposition are discussed and critiqued. All methods used in this study are then collated, including criteria and standards for recording taphonomic modifications. The chapter concludes with a discussion of how these methods can be combined to understand depositional practices

5.2 Development of taphonomic research

The term ‘taphonomy’ was coined by palaeontologist Ivan Efremov (1940, 93) and defined as the “science of the laws of embedding”, encompassing the transition of organic material from the biosphere to the lithosphere. As a concept and methodology, taphonomy mainly emerged in three distinct disciplines: palaeontology, zooarchaeology and forensic anthropology. The interdisciplinary nature of the field holds true in its application to the analysis of human bone assemblages. Within archaeology, zooarchaeologists were the first to realise its potential; scholars researched the variables responsible for the formation of faunal assemblages, including differential survivorship of elements and their effect on quantification (Lyman 1984) and processes of bone modification, such as weathering, trampling and cutmarks (Behrensmeyer 1978; Behrensmeyer *et al.* 1986; Olsen and Shipman 1988). Ethnoarchaeological studies were conducted with the aim of providing a middle range theory to classify faunal assemblages as the result of hunting by carnivores or hominids (Binford 1981; Blumenschine 1988; Brain 1967; Gifford 1981). Many of these studies continue to inform the standards and methodologies implemented by osteoarchaeologists.

Within forensic anthropology, establishing the timing of modifications to human remains is a key aspect of the medico-legal process (Haglund and Sorg 1997). Taphonomic investigations have established important considerations through case studies and experimental research, including into the process of decomposition (Bass 1997; Clark *et al.* 1997; Damann and Carter 2014; Galloway *et al.* 1989; Pinheiro 2006), the effects of burning (Symes *et al.* 2008; Symes, L'Abbé, Pokines, *et al.* 2014), and signatures of animal activity (Haglund 1997a, 1997b; Pokines 2014). Case studies frequently describe the effects of natural processes to soft tissue, a concern which had been previously overlooked in archaeology due to the uptake of methods from faunal studies. However, the nature of forensic work, where observations are often made on individual skeletons, does not easily lend insights from this field to archaeology, which often focuses on statistical analyses of large assemblages (Knüsel and Robb 2016, 655).

Forensic research influenced archaeology, resulting in attempts to apply taphonomic analysis to the study of ancient burials. Ubelaker's (1974) detailed treatment of the skeletal assemblages from the Nanjemoy Creek ossuaries in Maryland, USA, is probably the earliest implementation of part representation analyses; his results were contextualised through reference to ethnographic burial practices, showing the wider significance of taphonomy for investigating past beliefs, rituals and interactions with the dead. The edited volume '*Death, decay and reconstruction*' (Boddington *et al.* 1987) represents one of the first syntheses of taphonomic research in archaeology, including consideration of the relative survival of skeletal elements due to intrinsic and extrinsic factors (Garland 1987; Henderson 1987; Waldron 1987) and the effects of funerary practices (Brothwell 1987).

Taphonomy became routine in osteological analyses in the 1990s (Buikstra and Ubelaker 1994). The importance of recording bone surface and shape changes was noted, and methods were devised for coding fragmented remains and complete skeletons. In recent years, taphonomic research has gained momentum and key volumes have been published. Several contribute to methodological advancements, particularly in forensics (Adams and Byrd 2014; Schotsmans *et al.* 2017), while the integration of taphonomic methods in archaeology is demonstrated through case studies spanning multiple regions and periods (Osterholtz, Baustian, and Martin 2014b; Osterholtz 2016) and a comprehensive photographic atlas of bone modifications provides an invaluable resource (Fernández-Jalvo and Andrews 2016).

Alongside taphonomic analysis, Duday's (2006, 2009) work on archaeothanatology (in French, *archéothanatologie* or *anthropologie du terrain*), comprises what may be called a 'taphonomy of the body'. The foundation of this method is the assumption that "the position of skeletal remains upon recovery does not reflect the original placement of the fleshed corpse at the time of burial" (Knüsel 2014, 27). Careful recording of human remains is therefore required to understand the space of decomposition. Decomposition is framed as a 'periburial' process, key to the interpretation of ritual and cultural behaviour (Roksandic 2002). This method is now being implemented on an international scale (e.g. Crevecoeur *et al.* 2015; Harris and Tayles 2012; Nilsson Stutz 2003; Nilsson Stutz *et al.* 2013). Importantly, the potential of archaeothanatology to investigate past beliefs about death and the body is highlighted (Duday 2009). Recognition that burial treatment provides crucial data on past understandings of the body is a key tenet of the emerging field of funerary taphonomy (see Knüsel and Robb 2016 and other papers in volume). Funerary taphonomy provides a methodology to analyse burial assemblages holistically, linking the preservation and condition of human skeletal remains to their depositional environment and cultural practices (Knüsel and Robb 2016). Archaeological burial data may be interpreted through comparison with ethnographic accounts of funerary rites and their intersection with belief systems (cf. Duncan and Schwarz 2014).

5.3 Factors affecting preservation

Identifying modes of deposition requires understanding the processes which affect the preservation of both soft tissue and skeletal remains. The main factors which impact preservation are briefly outlined below, including the processes of decomposition, bone diagenesis, and differential preservation.

5.3.1 Decomposition

Except in extremely hot or cold anaerobic environments, decomposition and putrefaction begin almost immediately after death (Mays 1998; Vass 2001). Decomposition can be a long process, encompassing multiple stages which affect both the soft and hard tissues of the body and eventually result in skeletonisation. The corpse will progress through the mortis triad (*algor mortis, livor mortis, rigor mortis*) usually within the first 2 days after death (Damann and Carter 2014). The rate of soft tissue decay depends on biological, environmental and cultural factors. Ligaments and tendons take longer to decay, as does hair due to its keratinous composition (Mays 1998, 15). Fat also influences the rate of decomposition; individuals with less fat, particularly young individuals) will skeletonise faster (Mant 1987). Key amongst environmental factors are temperature, soil pH, the presence or absence of water, oxygen, and other organisms. Decomposition begins earlier and progresses faster when bodies are exposed to warm, humid air immediately upon death, while colder temperatures and burial in soil slow the process (Galloway 1997; Pinheiro 2006). As such, individuals who have died in spring and summer will decompose more rapidly than those who have died in autumn or winter (Rodriguez and Bass 1983). Burial inhibits the access of insects and other animals to the body and decomposition proceeds mainly through autolysis and putrefaction (Rodriguez III 1997). The presence of clothing or coverings on the body often slows decomposition (Mant 1987). Soft tissue decomposition may be halted through natural or artificial methods of mummification, with natural methods including the exploitation of specific environmental conditions, such as frozen tundra (Rudenko 1970) and peat bogs (Painter 1991).

The timing of skeletonisation can vary widely but is particularly influenced by depositional environment and season. Skeletonisation and disarticulation typically proceed in a cephalic to caudal direction, and from the centre to the periphery (Clark *et al.* 1997; Pinheiro 2006). The average length of time for a cadaver to fully skeletonise is estimated to be three years (Pinheiro 2006, 111), although in very hot environments with intense beetle activity it may take as little as three days (Clark *et al.* 1997, 160). Soil depth drastically affects the rate of skeletonisation. Decomposition can occur within six months to one year in shallow graves of approximately 1 foot deep, but decompositional time increases as temperatures decrease with grave depth (Rodriguez III 1997). Forensic research also reminds us that a single cadaver can present multiple stages of decomposition. Localised areas of soft tissue preservation or advanced decay can be present due to a number of factors, including clothing, traumatic injuries and scavengers (Clark *et al.* 1997; Pinheiro 2006).

Duday's (2006, 2009; Duday and Guillon 2006) archaeothanatological methods account for these principles. Understanding decomposition facilitates interpretation of the relationship between the processes which can affect a corpse and influence the position of buried skeletal remains, providing a series of expectations regarding articulation in cases of primary, secondary and multiple deposition. Skeletal elements which disarticulate early during decomposition are termed 'labile' articulations, whilst those held in place by more resistant ligaments and soft tissues are termed 'persistent' articulations (Duday and Guillon 2006, 126). Through the process of decomposition, the decay of organic grave furnishings, and interference by external agents, skeletal remains are expected to have moved following deposition. Accounting for these variables allows the original position of the corpse to be reconstructed. Individual primary inhumation is often observed through the preservation of skeletal elements in their correct anatomical position as ligaments remain intact due to burial shortly after death (Duday 2006, 33). However, bones may move as a result of space within the burial context or empty spaces created in the body during decomposition (Duday 2006, 34–45). Secondary deposition is usually indicated through isolated elements, articulating regions of bones, or through articulated skeletons from which discrete bones have been later removed (Duday 2006, 45–48). In the case of multiple or collective depositions, it is key to establish the timing of depositional events; this is particularly complicated if sufficient time has not elapsed to disrupt articulations early in the decompositional process (Duday 2006, 50–52).

5.3.2 Bone diagenesis

Following soft tissue decay bone undergoes diagenesis, a process by which its composition is altered (Hedges 2002). Many of the factors which affect the rate of soft tissue decay similarly impact bone, particularly extrinsic conditions such as disturbance from plants and animals, the effects of soil, water, temperature and air.

The rate of bone diagenesis is strongly determined by groundwater pH and temperature (Nielsen-Marsh *et al.* 2000). Bone survives best in sediments with a neutral pH and is particularly degraded when deposited in acidic environments. Hydroxyapatite, comprising approximately 60% of the composition of bone, becomes soluble below 6.5 pH (Mays 1998, 17). Better conditions are found in limestone caverns, which are usually said to have a pH value in the range of 7.5–8 (Pokines and Baker 2014, 76). The limestone geology of the Maltese islands favours the preservation of osseous material. Microbial attack affects bone within the first few decades of burial; organisms such as fungi, bacteria and algae all cause bone demineralisation, and this is particularly rapid in higher temperatures. Waterlogged sediments, or continuous cycles of inundation and drying, lead to the leaching of collagen from bone (Mays 1998, 21). Successive drying can result in shape changes and cracking, much like burning (Evans 2014). The constant process of heating and cooling on bone exposed to the elements leads to a cycle of expansion and contraction, which can cause localised stress fractures (Junod and Pokines 2014, 297).

Many of these processes have the potential to disperse bones across a site or through stratigraphic contexts, away from their original place of deposition. In the case of disarticulated bones, fluvial action tends to carry away small and rounded elements and can result in the patterned orientation of long bones parallel to the direction of flow (Lyman 1994, 177). This process might be indicated through general surface abrasion and thinning of the cortex and supported by spatial patterning on excavation plans. Gravity may be responsible for smaller or lighter elements falling vertically through contexts or, in the case of a burial platform which decays, result in disarticulated skeletal remains which do not reflect the mode of primary inhumation (Duday and Guillon 2006).

5.3.3 Differential preservation

Preservation differs across skeletal elements due to variations in their shape, size, density, composition and age, alongside ante-mortem alterations such as disease and trauma (Bello 2005; Henderson 1987). These intrinsic properties of bon, combined with the environment in which they are deposited, all affect differential preservation. Rates of decay and diagenesis are generally inversely proportional to bone size, such that small bones are more likely to be under-represented archaeologically (Von Endt and Ortner 1984).

Study of the remains of individuals of known age and sex from Spitalfields revealed that the extent of bone preservation increases with biological age; however, adult individuals were not further subdivided by age, and the effects of ageing on bone preservation were not established (Bello and Andrews 2006; Bello *et al.* 2006). Environmental factors also favour adult remains, with nonadult remains more adversely affected by soil pH (Gordon and Buikstra 1981). The fragility of nonadult remains is related to their lower bone mineral density; this is evidenced by their under-representation compared to adult bones at Crow Creek (Kendell and Willey 2014) and is likely to be the case for elderly adult remains, as indicated by their low numbers at the 19th Century Purisima Mission Cemetery in California (Walker 1995). This bias can adversely affect MNI calculations, leading to an over-representation of young adults. If taphonomic processes within an assemblage are noted to be closely related to bone mineral density, it is likely that such age-related bias has occurred.

Bone density related attrition can be examined through assessing the relative representation of all skeletal elements and, further, the representation of upper limb elements to lower limb elements, and epiphyseal to diaphyseal fragments (Atici 2014, 230). Density-mediated attrition can affect the same element differently; for example, the proximal humerus is much less dense than the distal epiphysis. An experimental study by Karr and Outram (2012a) has shown that both gnawing and fluvial transport produce the expected attritional pattern. In contrast, assemblages subjected to physical force such as a rock fall are likely to exhibit the reverse, as low-density cancellous bone can better absorb shock (*ibid.*). Differential element preservation therefore relates closely to bone size, shape and weight (Galloway *et al.* 1997, 313). Environmental factors affecting element representation are multiple and complex, but mortuary practices can also be responsible. Assemblages which exhibit a low representation of dense elements may indicate specific practices which resulted in selective bone destruction or removal. Taphonomic alterations continue after excavation; bone preservation depends upon factors such as cleaning, the use of consolidants, transport methods, curation and storage conditions, and handling (Stodder 2008, 73). The dispersal of a collection across different institutions, and at different times, can also affect bone preservation and part representation.

Crucially, funerary taphonomy requires understanding the relationship between multiple factors which affect human remains before, during, and after burial or deposition. This aim is complicated by equifinality (Lyman 2004), as there are often a variety of possible causes for a taphonomic signature or differential preservation of skeletal elements (Outram 2004, 173; Ubelaker 1997). Helical fractures, for example, are often inferred as the result of anthropogenic action, but carnivore gnawing and trampling can produce similar outcomes (Lyman 1994, 324). It is currently debated whether cultural and natural agents ought to be analysed separately to distinguish meaningful, ritual actions (see Knüsel and Robb 2016, 656). However, this view unhelpfully reifies anthropocentric thought and it is argued that Efremov's original definition of taphonomy did not make such a distinction (Lyman 2010).

5.4 Recording methods

This section outlines the methods used to record demography and taphonomic alterations in this study. The structure of this section follows the process from inventory to analysis: from element identification, to recording preservation and size, determining surface modifications from a range of possible agents, and quantifying the results.

5.4.1 Demography

Demographic information was recorded when possible, including estimation of age and sex, and brief description of dental and skeletal pathology. When possible, skeletal remains were categorised according to one (or overlapping the boundaries of two) chronological age ranges, following the categories detailed in Stoddart *et al.* (2009) (Table 5.1). Dental eruption was used as a method of age estimation following Ubelaker (1989) and AlQahtani *et al.* (2010). Epiphyseal fusion and ossification rates have informed the age estimation of nonadults and, where possible, measurements and formulae from Schaefer *et al.* (2009) were used to refine the age estimate. It is likely, due to the commingled nature of the material, that some adolescent remains have not been recognised due to the varying stages at which elements throughout the skeleton fuse (Ubelaker 2002). Adult age was estimated through morphological changes to the *ossa coxae* (Brooks and Suchey 1990; Lovejoy *et al.* 1985; Todd 1920). Dental attrition is recognised as an inaccurate age estimator for this population due to the very variable wear observed on permanent molars across the assemblage (Stoddart *et al.* 2009, 318).

Sexually dimorphic features of the skull and pelvis were scored following Buikstra and Ubelaker (1994). However, these traits are of varying value for sex determination (Đuri *et al.* 2005; Meindl *et al.* 1985; Williams and Rogers 2006) and are not conclusive unless assessed across a complete skeletal series. Dental and skeletal palaeopathological lesions have been briefly noted when observed (Buikstra and Ubelaker 1994; Ortner 2003).

Category	**Age**
Foetus	Under 40 weeks
Perinate	38–42 weeks
Neonate	Birth–1 month
Infant	1 month–1 year
Young child	1–8 years
Old child	8–14 years
Adolescent	14–18 years
Young adult	18–35 years
Middle adult	35–50 years
Old adult	50+ years

Table 5.1: Age categories.

5.4.2 Completeness, preservation and zonation

Due to its widespread use, element completeness has been recorded for each bone fragment using the Anatomical Preservation Index (API) and cortical bone preservation was recorded following the Qualitative Bone Index (QBI) (Bello 2005; Bello and Andrews 2006). Both methods describe fragments as representing either 0%, 1–24%, 25–49%, 50–74%, 75–99% or 100% of the element and/or cortical surface.

In cases of high fragmentation, quantification can be distorted due to duplicate recording. Implementing a zonation method allows skeletal elements to be divided into distinct zones or features; the presence or absence of each zone is noted, facilitating more accurate recording of element completeness. A few methods of zonation recording are regularly used, including White (1953), Buikstra and Ubelaker (1994), and methods specifically developed for fragmented remains (Knüsel and Outram 2004; Mack *et al.* 2016). White (1953) divides long bones into 3 zones (proximal and distal epiphyses and diaphysis) while other elements are recorded in increments of 25%. Each zone is described as absent or present, regardless of the amount of the zone preserved, and the most prevalent zone equals the MNE (Minimum Number of Elements). Buikstra and Ubelaker (1994, 7) use 5 zones for long bones, dividing the diaphysis into thirds, and record element preservation on a scale of 1–3 (where 1=<25%; 2=25–75%; 3=>75%). The zonation method developed for fragmented faunal assemblages by Dobney and Rielly (1988) divides each element into zones which are recorded as more or less than 50% complete; the zone recorded most frequently at more than 50% complete thus equals the MNE. This system was adapted for human remains by Knüsel and Outram (2004), with further zones developed for elements that were previously unaccounted for. Mack *et al.* (2016) have refined this through the development of a method based upon anatomical landmarks.

Three of these methods—White (1953), Knüsel and Outram (2004) and Mack *et al.* (2016) —have been compared through the analysis of a commingled assemblage from a Spanish Medieval cemetery (Lambacher *et al.* 2016). The total assemblage of 8847 fragments was recorded and quantified three times, using each method. The analysts found that White's (1953) method returned the largest MNI (84), and thus revealed some potential for double counting; they suggest that to minimise this effect only specimens which are >50% complete should be counted (Lambacher *et al.* 2016, 678). Between the zonation method and the landmark method, the difference in output was minimal, at 68 individuals and 61 individuals respectively. Within the zonation method, the cranium is only divided into individual cranial bones, along the left and right sides (Knüsel and Outram 2004, 93), and this was revealed as a weakness (Lambacher *et al.* 2016, 679). The landmark method refines cranial recording with a total of 52 possible landmarks, including features on the endocranium (Mack *et al.* 2016, see supplementary information). The authors conclude that the landmark method returned the minimum MNI and the results were not significantly affected by conjoining (*ibid.*).

Since many fragments from the Xagħra Circle and Xemxija tombs assemblages cannot be identified to such a high level as that represented by Knüsel and Outram's (2004) and Mack *et al.*'s (2016) methods, a maximum of five zones for all elements except the cranium and extremities was deemed sufficient. The quantification potential of a 35 mm fragment of femoral diaphysis, for example, will not be maximised by zonation recording if it cannot be assigned to the left or right side. Thus, the method described by Buikstra and Ubelaker (1994, 8) has been largely adopted in the present study. Long bones were recorded in five segments: proximal and distal epiphyses, with the diaphysis divided into thirds, and crania divided into individual elements, corresponding to the 15 zones outlined by Knüsel and Outram (2004). Mandibles have been inventoried in five zones, including the body, and the coronoid process and condyle of each side. Elements of the axial skeleton, the pectoral and pelvic girdles, and small elements of the hands and feet have been subdivided into zones represented by their main features which are usually diagnostic when fragmented (see Appendix 1.1). Considering the results of Lambacher *et al.*'s (2016) study, quantification proceeded only through inclusion of fragments which were ≥50% complete, and zones which were ≥50% represented.

5.4.3 Fragment size

In cases of extreme fragmentation, Outram (2001) recommends weighing unidentifiable fragments and recording them as either cortical or trabecular bone in order to maximise their informative potential. If specimens retain sediment or have sediment adhering to their surface, however, their weight will be increased. This is the case for much of the Xemxija Tombs and Xagħra Circle assemblages. Unidentifiable fragments have instead been manually sorted and measured. Identifiable fragments have been measured to the nearest millimetre using a ruler; this provides a higher margin of error than callipers but was utilised for efficiency. Unidentifiable fragments were sorted into 'cranial', 'long bone' or 'miscellaneous' fragments. Within these categories, fragments were further divided into size groups (following Knüsel and Outram 2004), from 0–20 mm followed by increments of 10 mm. Fragment size provides a useful marker of the level of post-depositional processing and can be used to assess the results of skeletal part representation when interpreting depositional practices (see §5.5.2).

5.4.4 Fracture morphology

Bone breaks diagnostically depending upon whether it is 'fresh', dry or mineralised. Bone retains its collagen matrix for a short period after death, during which it remains green or 'fresh', rendering it more plastic and flexible in response to impact. It will typically break in a curved or radial fashion with smooth edges, while dry bone breaks tend to be transverse to the long axis of the bone, with jagged and stepped edges (Figure 5.1). Fractures can therefore be categorised according to whether they occurred during the Peri-Mortem Interval (PMI), defined as the period before bone mineralisation occurs, or post-mortem, when bone is dry and fully mineralised (Outram 2002; Symes, L'Abbé, Stull, *et al.* 2014; Wieberg and Wescott 2008). Wieberg and Wescott (2008) investigated the timing of the PMI, finding that breakages presented post-mortem characteristics around 5 months after death, although these characteristics were occasionally present as early as 2 months after death. Similarly, Wheatley (2008) found that fracture morphology was reliable at the statistical level, but individual fragments were not always diagnostic. It is common for fragments to exhibit multiple fracture morphologies, making them difficult to categorise (Villa and Mahieu 1991, 34).

Bones react variably to stress, and therefore fracture differently, based on their type (e.g. skeletal element, and ratio of cortical to trabecular bone), age of the individual, location of fracture site, and existing pathological conditions (Symes *et al.* 2012, Symes, L'Abbé, Stull, *et al.* 2014). Much research has focused on the way that long bones react to blunt force trauma, although often utilising faunal remains as a proxy in experimental studies (Karr and Outram 2012b; Wheatley 2008; Wieberg and Wescott 2008). One study suggested that irregular and flat bones react similarly to long bones in response to perimortem blunt force trauma, but this is not widely proven (Moraitis *et al.* 2009). Villa and Mahieu (1991) found fracture angle, outline, shaft circumference and fragmentation to be of statistical importance. Wieberg and Wescott (2008) additionally recorded the colour of fracture edges; this is useful for distinguishing recent breaks but less reliable for discerning fresh versus dry bone breaks. As seen in Figure 5.1D, fracture margins on dry bone often present a similar colour to the cortex due to the process of commingling. Difficulty arises when attempting to distinguish intentional breakage. It is usually assumed that peri-mortem, spiral breaks are human-induced, although this may not always be the case (cf. Lyman 1994, 324).

Feature	**Definition**	**Fresh bone characteristics**	**Dry bone characteristics**
Fracture angle	Angle corresponding to cortical surface: obtuse, acute, right angle or mixed.	Obtuse or acute angle.	Right angle.
Fracture outline	Shape of fracture: transverse, curved or intermediate.	Curved or v-shaped following the diaphysis.	Transverse, across the diaphysis, or longitudinal splinters.
Fracture texture	Texture of the bone structure at the fracture margin.	Smooth fracture surface.	Rough or jagged fracture surface.
Surface colour	Colour of the fracture margin in relation to the cortical surface.	Similar colour observed on both fracture and cortical surfaces.	Different colours on both fracture and cortical surfaces.

Table 5.2: Summary of features examined for fragmentation morphology (adapted from Wieberg and Wescott 2008, 1029).

Figure 5.1: Long bone fragmentation morphology. Fresh fracture characteristics – acute and obtuse angles, curved outline (A) and smooth texture (C); Dry bone fracture characteristics – right angle, rough margins (B, D), longitudinal direction (B), and transverse outline (D) (photos by author).

In this research, fragmentation margins are characterised according to a series of morphological features to broadly infer the condition of bone at the time of breakage (Table 5.2) and only long bone diaphyseal fragments have been analysed. Outram's (2002) Fracture Freshness Index (FFI) has been adopted. Angle, outline and texture are each scored from 0–2 in order to classify whether fractures are consistent with fresh breakage or post-depositional breakage. A score of 0 indicates fresh fracture characteristics, 1 denotes a mixture of fresh and dry morphologies, whilst 2 describes mineralised and dry bone breakage. As one fragment may display several breakage types, the earliest fracture event is recorded. If a post-depositional and an excavation fracture are both present, the post-depositional break is recorded and excavation damage is noted in a separate column in the database (with a score of '1' in 'ExcDamage'). Summing the score for each fragment analysed gives a total of up to 6. A total of 0 is consistent with fractures during the peri-mortem interval, a total from 1–3 is consistent with the peri-mortem interval, or early stages of mineralisation, and 4–6 indicates dry bone breakage (Outram 2002).

5.4.5 Weathering

Weathering is most often recorded utilising the system developed by Behrensmeyer (1978), which is adopted here. Behrensmeyer observed the effect of weathering on faunal remains in Kenya, describing six stages of modification which represent progressive destruction of the cortical surface (Table 5.3; Figure 5.2). The most advanced weathering stage observed on each fragment is recorded. The location of weathering may correspond to the position of the bone when it was exposed (i.e. the upper surface will be more weathered). However, the degree of weathering cannot indicate the length of time remains were exposed for, as this is environmentally specific (McKinley 2004, 15). Studies have shown that the timing of weathering varies widely. Andrews (1995) reports that surface weathering is much slower in a temperate environment. Additionally, studies of cortical modifications attributed to weathering, such as cracking and flaking, have shown that these can be caused by highly alkaline or humid environments, as well as bones exposed to dampness or sediment pressure (Fernández-Jalvo and Andrews 2016, 201). While there are limitations to Behrensmeyer's method, it is the standard reference for recording such cortical modifications. The method is best viewed as descriptive, with temporal inferences made independently for each assemblage based upon context and environment. Consideration of the causes of cortical flaking and splitting should be made based on a holistic understanding of the assemblage's depositional environment and overall indicators of taphonomic processes and changes.

Stage	Description
0	Bone surface shows no sign of cracking or flaking due to weathering.
1	Bone shows cracking, normally parallel to the fibre structure (e.g. longitudinal in long bone). Articular surfaces may show mosaic cracking.
2	Outermost concentric thin layers of bone show flaking, usually associated with cracks, in that the bone edges along the cracks tend to separate and flake first. Long thin flakes, with one or more sides still attached to the bone, are common in the initial part of stage 2. Deeper and more extensive flaking follows, until most of the outermost bone is gone. Crack edges are usually angular in cross section.
3	Bone surface is characterised by patches of rough, homogeneously weathered compact bone, resulting in a fibrous texture. In these patches, all the external, concentric layers of bone have been removed. Gradually the patches extend to cover the entire bone surface. Weathering does not penetrate deeper than 1.0 – 1.5 mm at this stage, and bone fibres are still firmly attached to each other. Crack edges are usually rounded in cross section.
4	The bone surface is coarsely fibrous and rough in texture; large and small splinters occur and may be loose enough to fall away from the bone if it is moved. Weathering penetrates into inner cavities. Cracks are open and have splintered or rounded edges.
5	Bone is falling apart, with large splinters. Bone easily broken by moving. Original bone shape may be difficult to determine. Cancellous bone usually exposed, when present, and may outlast all traces of the former more compact, outer parts of the bones.

Table 5.3: Bone weathering stages, following Behrensmeyer (1978), from Buikstra and Ubelaker (1994, 98).

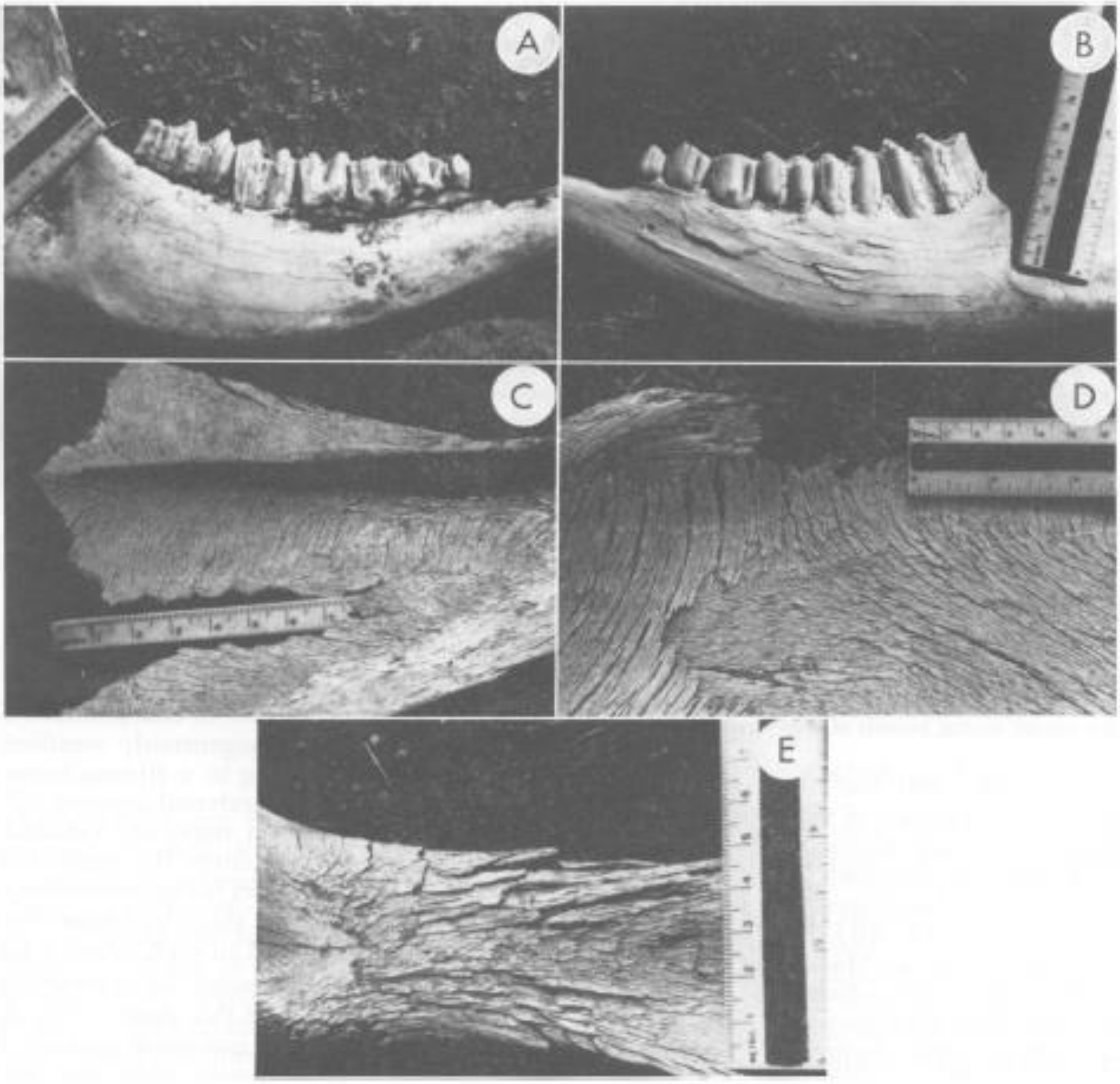


Figure 5.2: Stages 1–5 of weathering. A. K. Behrensmeyer, 1978, 'Taphonomic and ecologic information from bone weathering' in Paleobiology 4(2), page 152, reproduced with permission.

5.4.6 Abrasion and erosion

Abrasion and erosion are recorded in this study using The Institute of Field Archaeologists' *'Guidelines to the Standard for Recording Human Remains'*, which classifies abrasive and erosive processes into a series of stages, scored from 0–5+, which describe the depth and extent of modifications (McKinley 2004a). These can be the result of numerous processes, including abrasion due to exposure, tumbling, repeated handling, and re-burial and erosion by soil, plant roots or fungus (McKinley 2004a, 15).

Abrasion by root damage typically presents as small, often short, grooves with a rounded or U-shaped profile (Figure 5.3). In discrete areas, an almost star-shaped cluster may be observed, while larger patches of root etching tend to be branching and curvilinear. The presence of root etching can indicate which surface of the bone was buried and is sometimes associated with soil staining. Roots may also stain the surface of bones, typically a dark red-brown colour, and are distinctive due to the dendritic pattern they produce (Dupras and Schultz 2014, 332). Furthermore, fungi have been noted to cause similar damage to plant roots through the invasion of hyphae into porotic structures within bone. They may attack bone in larger focal areas, feeding off the soft tissue or remaining organic content, resulting in a pattern of damage similar to corrosion by acidic soils. In addition, after roots have invaded the diaphysis or trabecular structure of bone, they may split the bone itself (Gabet *et al.* 2003, 251).

Figure 5.3: Root erosion scored as stage 3 on a femoral fragment from the Xagħra Circle (photo by author).

5.4.7 Discolouration

Numerous agents can cause discolouration and staining, including the sun, soil, organic matter such as plant roots and fungus, minerals and metals (Dupras and Schultz 2014, 332). Burning is considered separately below (§5.4.9). Metallic staining is excluded, as copper was not in use in Malta until the Tarxien Cemetery phase, c. 2300 BC (Sagona 2004, 116). However, ochre was used extensively in funerary practices and bones were often stained bright red (Sagona 2015, 54; Figure 5.4). Thus, discolouration can reveal insights into both the depositional environment and funerary rites. Organic matter such as plants, mosses and algae tend to stain bone either green, yellow, or orange/red (Dupras and Schultz 2014, 331). Bone staining was described according to colour and, when relevant, the size and extent of staining was noted.

Figure 5.4: Anterior and posterior view of a sacrum with ochre staining from the Xagħra Circle rock-cut tomb (photos by author).

5.4.8 Animal damage

Animal damage is usually attributed to carnivore, herbivore, rodent or insect activity which each produce distinct marks. Scavenging birds have been noted to deflesh remains and occasionally damage bone (Domínguez-Solera and Domínguez-Rodrigo 2011; Marín-Arroyo and Margalida 2012), but as no large avian predators were present in Neolithic Malta, these have been excluded from this discussion.

Rodent, carnivore and herbivore gnawing are distinguishable due to their size and morphology. Rodents produce flat-bottomed grooves in short, parallel striations on bony ridges, crests and diaphyses (Figure 5.5; Loe and Cox 2005). Herbivore and carnivore chewing may present similarly, as linear marks with a u-shaped cross-section, although carnivores puncture bone with their canines, while herbivores chew dry bone using their buccal teeth (Fernández-Jalvo and Andrews 2016, 32). Carnivore gnaw marks can present as punctures, pits, scores and furrows (Haglund 1997), and extensive gnawing can lead to crenulated edges and spiral fractures to bone shafts (Figure 5.6; Smith 2006). As herbivores exploit dry bone to extract minerals (osteophagia), gnaw marks may overlie weathered bone (Fernández-Jalvo and Andrews 2016, 32) and extensive chewing can produce fork-shaped damage to long bone diaphyses (Brothwell 1976).

Binford (1981) noted different patterns of gnawing produced by canids at kill sites and dens. When meat consumption was the main goal, articular ends received the most damage, but when bones were no longer protected by soft tissue, extensive chewing produced ‘bone cylinders’. Haglund (1997a) defined 5 stages of carnivore scavenging, from soft tissue removal, through to disarticulation of the upper and lower extremities and, eventually, complete disarticulation. As scavenging becomes more advanced, bones are progressively disarticulated and dispersed (Binford 1981, 206). For forensic purposes, these stages are correlated with time since death. For archaeological analyses, based upon the location of gnaw marks it is possible to estimate the extent of scavenging, leading to interpretations of funerary behaviour (e.g. Smith 2006).

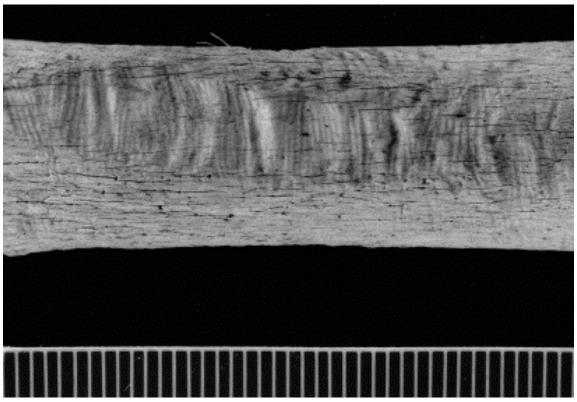


Figure 5.5: Rodent gnawing on long bone diaphyseal crest from experimental study. Reproduced with permission from Springer: *Atlas of Taphonomic Identifications* by Y. Fernández-Jalvo and P. Andrews copyright 2016, page 77.

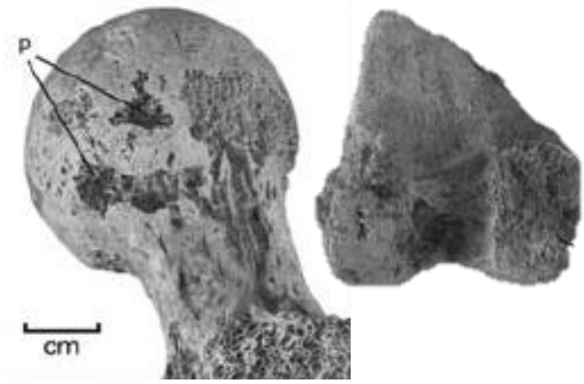


Figure 5.6: Punctures to femoral head (caused by canine teeth) and furrowing to distal femoral epiphysis and femoral head. M. Smith, 2006, 'Bones chewed by canids as evidence for human excarnation: a British case study' in *Antiquity* 80, page 676, reproduced with permission.

The study of insect damage to skeletal remains, known as 'funerary archaeoentomology', is a relatively new field of research (Huchet 2014; Vanin and Huchet 2017). Four insect taxa are known to target osseous remains ('osteophagy'), including termites (*isoptera)*, wasps and wild bees (*hymenoptera)*, some species of *diptera* larvae, and dermestid beetles (*coleoptera)* (Vanin and Huchet 2017, 181). Each taxon creates distinct forms of modification and shows varied preferences for environment, temperature, and types of bone.

Termites gnaw both buried and exposed bone and, whilst they tend to display a preference for fresh over fossilised remains, they have been shown to modify remains in all states of preservation (Backwell *et al.* 2012). They can produce star-shaped clusters of striations, parallel striations, bore holes, etching, pits, and edge gnawing (Backwell *et al.* 2012; Figure 5.7). Termites also tunnel through bone, especially thin and fragile elements (Huchet *et al.* 2011; Figure 5.8). Solitary bees and wasps (*hymenoptera)* similarly perforate bone to construct nesting galleries (Pittoni 2009; Figure 5.9). Uniquely, *diptera* larvae erode bone when they regurgitate their acidic digestive juices (Huchet 2014, 342).

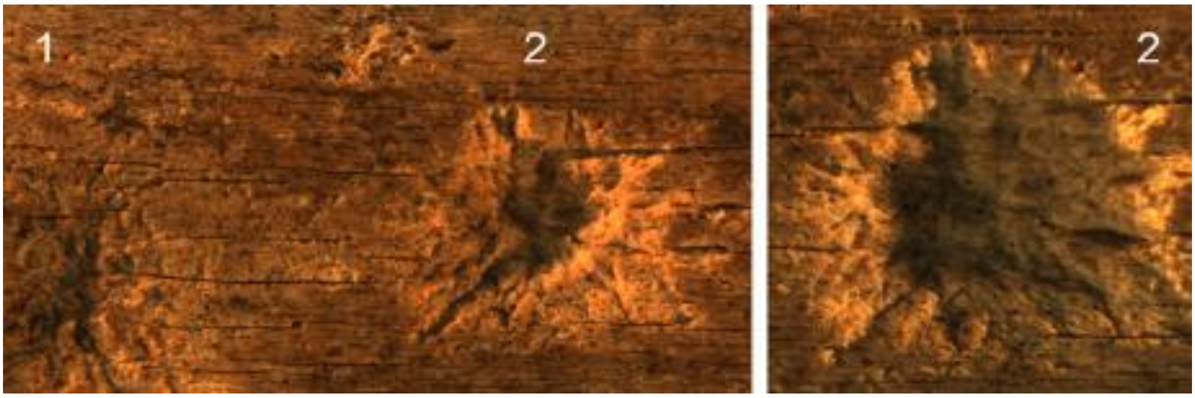


Figure 5.7: Termite damage to human tibia from the Middle Stone Age site of Plovers Lake Cave, South Africa showing star-shaped clusters of striations. Reprinted from *Palaeogeography, Palaeoclimatology, Palaeoecology* 337-338, L. Backwell *et al.* 'Criteria for identifying bone modification by termites in the fossil record', copyright 2012, page 75, with permission from Elsevier.

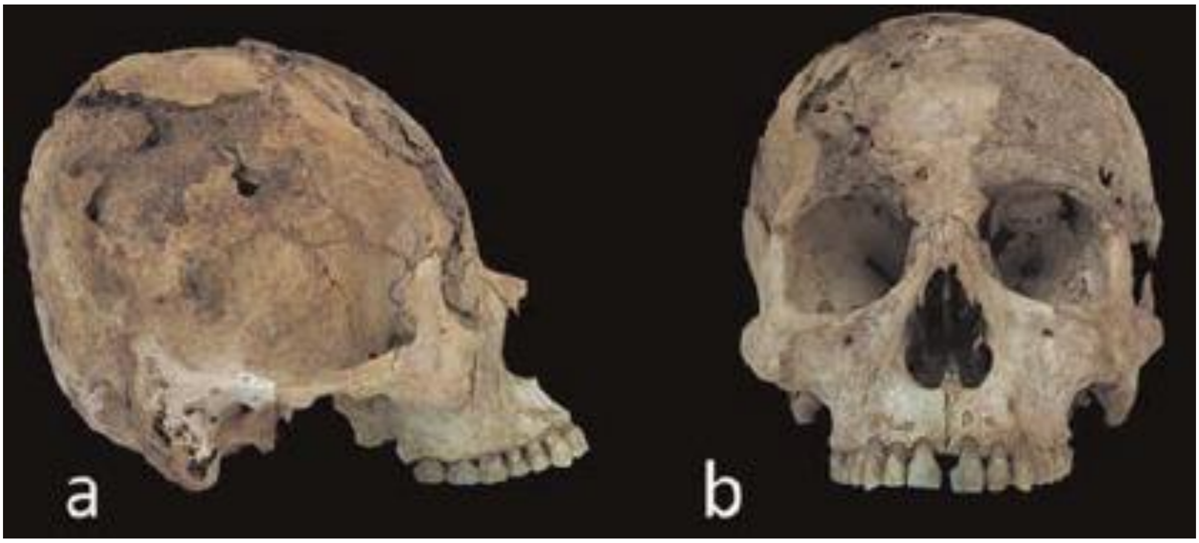


Figure 5.8: Termite damage to Moche cranium from Peru, viewed from lateral view (a), anterior (b) and left lateral (c) aspects exhibiting tunnelling, bores, furrows and pits (edited from Huchet *et al.* 2011, 95). Reproduced with the permission of John Wiley and Sons.

Figure 5.9: Right lateral view of cranium from Pill'e Matta necropolis, Sardinia, exhibiting tunnelling, pits and bores due to solitary wasps and bees (Pittoni 2009, 394). Reproduced with the permission of John Wiley and Sons.

Figure 5.10: Human skeletal fragments from Tomb E1, Jericho exhibiting dermestid bore holes. Reprinted from *Journal of Archaeological Science* 40, J. Huchet *et al.* 'Identification of dermestid pupal chambers on Southern Levant human bones: inference for reconstruction of Middle Bronze Age mortuary practices', copyright 2013, page 3794, with permission from Elsevier.

Much archaeological and palaeontological research has focussed on dermestid modifications (Britt *et al.* 2008; Holden *et al.* 2013; Huchet *et al.* 2013; Martin and West 1995). Dermestids feed on sub-aerially exposed desiccated tissues, specifically targeting corpses in advanced decomposition, and they rapidly advance the process of skeletonisation (Huchet *et al.* 2013). Soft tissue must be present for the complete life cycle of the dermestid (between 5–15 weeks) at a minimum temperature of 15°C (Huchet 2014). Following feeding, they may excavate pupal chambers into dried tissue and bone to avoid predation (Archer and Elgar 1998), creating bores between 2–5 mm in diameter (Britt *et al.* 2008; Huchet *et al.* 2013; Martin and West 1995). Dermestid damage may also take the form of pits and surface alterations such as furrows and grooves (Britt *et al.* 2008). Dermestid modification of human remains has been reported from Middle Bronze Age collective deposition contexts at Munhata and Jericho (Huchet *et al.* 2013; Figure 5.10). Due to the circumstances under which dermestids feed and burrow, two hypotheses were suggested: that the remains of some individuals were exposed before deposition or that dermestids colonised the tomb to feed on the decomposing remains of primary burials. Given that dermestid modifications were only evident on a small proportion of the remains, the former hypothesis was considered most likely.

5.4.9 Burning

Burning is usually recorded as changes to the colour and texture of bone, which relate to the temperature and length of time bone has been exposed to fire (Stodder 2008, 97; Walker *et al.* 2008). Bone colour changes at different stages of burning, all of which may be present on one fragment (Brickley 2007; Symes, L'Abbé, Pokines, *et al.* 2014). Charred bone is often black or grey while fully calcined bone is white, although a range of colours in between can be observed which indicate incomplete oxidisation (Figure 5.11). Bone responds to burning through shape change, including shrinking, warping, and cracking. Although some argue these morphological changes can indicate whether bone was burnt when dry or fleshed (Ubelaker 2009), there is debate as to the reliability of these indicators, based upon the large number of variables involved (Brickley 2007, 72). In this study, burning was recorded by colour (Table 5.4), location and extent.

Temperature (°C)	**Colour**
185	Red/orange
285	Dark brown/black
360	Black
440	Grey/brown
525	Lighter grey/brown
645–1200	White/pale yellow

Table 5.4: Temperature ranges associated with bone colour (Mays 2002, 217).

Figure 5.11: Calcined bone exhibiting localised areas of blue-black charring and longitudinal cracking (Symes, L'Abbé, Pokines, *et al.* 2014: 371). Republished with permission of Taylor & Francis Group, from *Manual of Forensic Taphonomy* (Editors: J. Pokines and S. Symes), copyright 2014; permission conveyed through Copyright Clearance Center, Inc.

5.4.10 Cut marks

Anthropogenic processing of remains typically involves the use of tools which leave traces in the form of cut marks. Analysis of these traces provides valuable information about cultural and ritual behaviour. Disarticulation and cutting of fleshed bodies is closely linked to cannibalism (Andrews and Fernandez-Jalvo 2003; Bello *et al.* 2016; Fernández-Jalvo *et al.* 1999; Fernandez-Jalvo and Andrews 2011; White 1992), while defleshing mostly skeletonised remains to produce clean bone is more often related to secondary funerary rites (Robb *et al.* 2015; Smith and Brickley 2004; Toussaint 2011). Often, further taphonomic damage will be observed, including fragmentation, percussion damage, and human tooth marks.

Cut marks exhibit a V-shaped cross-section and, when made with flint tools, internal striations are observed (Greenfield 1999, 2006; Olsen and Shipman 1988). Identification of cut marks should be confirmed through Scanning Electron Microscopy (Greenfield 2006), although micro-CT scanning and 3D microscopy facilitate morphometric analysis (c.f. Bello *et al.* 2013). The frequency, distribution, and morphology of cut marks are closely linked to funerary practices (Bello *et al.* 2016; Smith and Brickley 2004; Wallduck and Bello 2016a; Wallduck and Bello 2016b). The distribution of cut marks varies according to their purpose; cuts to disarticulate elements will be found at areas of major ligament and tendon attachments (Figure 5.12), while defleshing correlates to soft tissue attachment sites (Figure 5.13) (Bello *et al.* 2016; Duday 2009; Robb *et al.* 2015). Morphometric analyses of cut marks from four prehistoric sites (Goughs Cave, Lepenski Vir, Padina and Vlasac) demonstrated a clear difference between disarticulation and defleshing, with disarticulation cut marks observed to be wider and deeper (Bello *et al.* 2016, 732).

In this study, potential cut marks were viewed under a hand lens, DinoLite and optical microscope. Cut marks were distinguished from excavation damage through their morphology, principally the shape of their cross section and the presence/absence of internal striations. Cut marks, by their nature, are produced on fresh bone. As such, it is expected that they will weather, patinate and be infilled with sediment. Where this is not the case, and striations are clean, they most likely represent excavation damage (Figure 5.14). Furthermore, cortical flaking and splintering (Figure 5.15) should not be associated with their margins, as bone should retain much of its collagen. The relationship between linear modifications and other taphonomic features, as well their location and distribution, are also key criteria.

Figure 5.12: Short, parallel cut marks on the lateral supracondylar ridge of a humerus from Lepenski Vir, Serbia, associated with disarticulation of the elbow; scale bar 10 mm (Bello *et al.* 2016, 729). Reproduced with the permission of John Wiley and Sons.

Figure 5.13: Multiple short transverse cut marks along anterior humerus diaphysis from Scaloria Cave, Italy, associated with the removal of periosteum and tendons. J. Robb *et al.*, 2015, 'Cleaning the dead: Neolithic ritual processing of human bone at Scaloria Cave, Italy in *Antiquity* 89, page 48, reproduced with permission.

Figure 5.14: Ilium from (783) in the Xagħra Circle hypogeum, imaged by author under magnification with the DinoLite. Cross-cutting incisions are shallow and free of patina and sediment. No internal striations within the incisions were observed. Resolved to be due to excavation damage.

Figure 5.15: Long bone from Xemxija Tombs imaged by author under magnification with the DinoLite. A localised area of transverse and diagonal striations is present within an abraded area of bone. The incisions are shallow and exhibit cortical flaking, suggesting insult to dry bone. Most likely due to excavation damage.

5.4.11 Articulation

The term 'articulation' conveys a specific meaning within the medical and forensic sciences, referring to the connection of bones at joints which facilitate their movement, therefore requiring connective soft tissue. It has been argued in a forensic context that the observation of bones in anatomical relationship but without soft tissue preservation should not be described as articulated (Sorg and Haglund 2002, 15). Although the decomposition of soft tissue provides the possibility for elements to be moved through taphonomic processes, it is standard bioarchaeological practice to define bones as in articulation when their position demonstrates that no post-depositional movement has taken place. Within this work, 'articulation' refers to elements found in anatomical connection during excavation, suggesting that soft tissue was preserved at the time of deposition.

Articulation provides key information relating to depositional practices, and facilitates application of aspects of archaeothanatological analysis (Duday 2006, 2009; Duday and Guillon 2006). In cases of disarticulated remains, labile and persistent joints are distinguished to determine the timing of the disruption of anatomical connections (Duday and Guillon 2006, 126–128). Labile joints disarticulate early during decomposition and their disruption can indicate movement soon after death. Primary inhumations will normally, but not always, preserve labile articulations. The dislocation of persistent joints typically indicates disruption further into the post-mortem interval, unless anthropogenic intervention is evidenced, for example through cutmarks.

Articulations were rarely observed in the laboratory and have only been noted in exceptional cases when elements were concreted. Analysis of *in situ* articulation proceeded through reference to excavation plans and photographs (Fig 5.16). In some cases, excavators at the Xagħra Circle cross-referenced numbers allocated on plans to individual bones through labels on finds bags; these numbers have then been recorded in the database. Furthermore, all excavation plans have been digitised in ArcGIS by the author and colleagues, allowing 3D visualisation and analysis of bone deposits. When information recorded in the laboratory can be integrated with visual analysis of articulation, depositional practices can be reconstructed by applying the principles of archaeothanatology. This process meets with some limitations, as the accuracy of excavation plans cannot always be assured and, due to their high density, not all bone fragments were drawn during excavation.

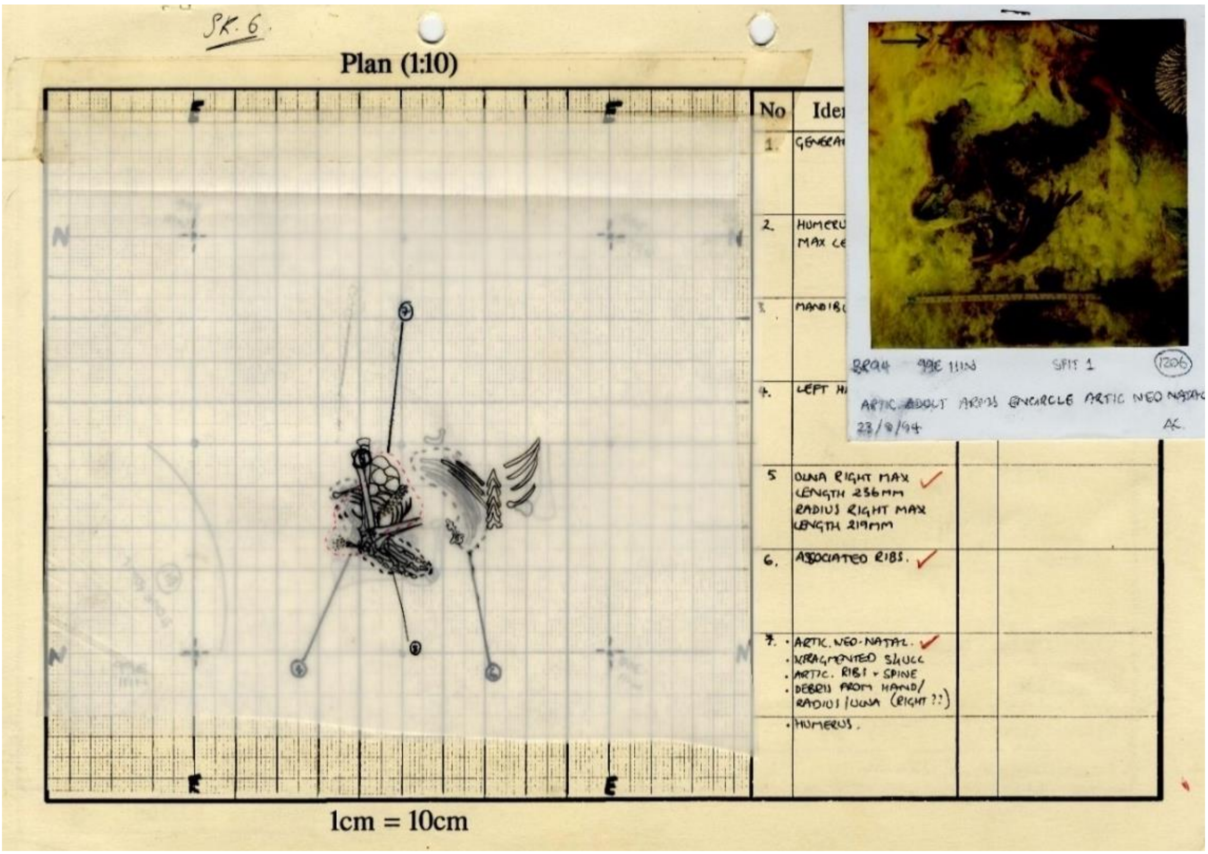


Figure 5.16: Example of excavation plan from Xaghra Circle, with bone numbers labelled and inventoried, and accompanying polaroid photograph (from BRX archive).

5.5 Quantifying the assemblage

Element identification, fragment size, preservation, and completeness all facilitate quantification to investigate element frequency, the extent of fragmentation, and skeletal part representation. Most methods begin with three calculations: NISP (Number of Identified Specimens Present) which totals all fragments identifiable to element, MNE (Minimum Number of Elements) which calculates the minimum number of elements needed to account for all fragments allowing for their frequency in the skeleton, and MNI (Minimum Number of Individuals) which extrapolates from MNE and accounts for age and sex to estimate the *minimum* population presented.

Each bears a complex relationship with fragmentation. NISP increases at low levels of fragmentation but as fragmentation increases, NISP, and both MNE and MNI, decrease due to difficulties of element identification (Figure 5.17; Marshall and Pilgram 1993). Differential preservation, excavation and curation practices, and analyst bias[1] all affect NISP, as it relies upon the accurate identification of small fragments. The relationship between MNI and NISP can be investigated by dividing the two to calculate percentage representation (Marshall 1989).[2] The fragmentation rates of individual elements within a context or site can be assessed by dividing the NISP for each element with their corresponding MNE (Lyman 1994).

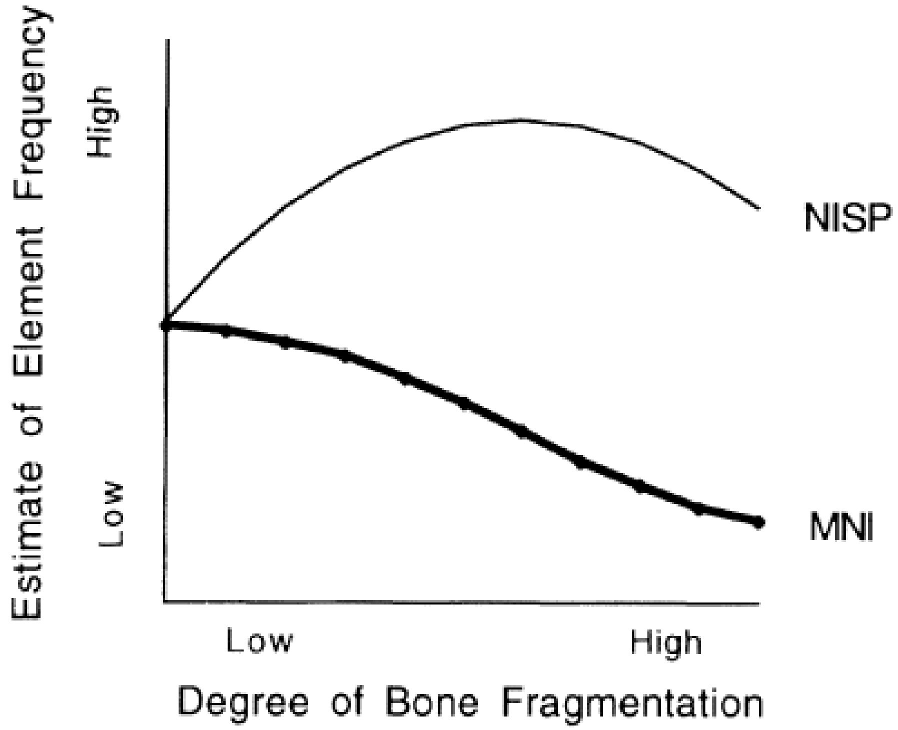


Figure 5.17: Hypothesised relationship between fragmentation, NISP and MNI. F. Marshall and T. Pilgram, 1993, 'NISP vs. MNI in quantification of body-part representation' in *American Antiquity* 58(2), page 266, reproduced with permission.

5.5.1 MNE and MNI

MNI aims to estimate the *minimum* number of individuals represented by the assemblage and is usually derived using the elements with the highest MNE each for adults and nonadults. As a demographic method, MNI does not indicate the total original burial population and is merely a representation of the recovered *preserved* population (Boddington 1987). Moreover, due to biases of skeletal age estimation methods and the potential for density-mediated attrition, MNI tends to under-represent nonadult and elderly individuals, whilst over-representing young and

[1] Analyst bias affects NISP counts as different researchers may employ different size thresholds for including fragments in their inventory. Additionally, the difficulty of accurate element identification increases as fragment size decreases, and it is more likely that fragments will be mistakenly assigned to different elements.

[2] This index has been used to represent fragmentation levels in each context at the Xagħra Circle (Stoddart *et al.* 2009, 316).

middle age adults (Kendell and Willey 2014, 99). The taphonomic processes of *in situ* destruction and, in the case of collective burial spaces, successive deposition, also detrimentally affect MNI (Robb 2016).

Simulation modelling of depositions in a collective tomb has shown that MNI will always under-represent the original *total* burial population (Beckett and Robb 2006; Robb 2016). If it is accepted that *any* destruction, no matter the rate, occurs to earlier burials due to successive inhumation, the MNI will always reach a much lower ceiling than the original total (Robb 2016, 688). Successive depositions were simulated at different rates for a length of 1000 years followed by 4000 years of *in situ* destruction prior to excavation. The results (Figure 5.18) showed a maximum achievable MNI of 70 whether 200 or 1000 bodies were deposited (Robb 2016, 688). The cumulative effects of natural and cultural taphonomic processes, even when set to conservative parameters, resulted in the observable MNI representing just a small fraction of the original burial population. Successive deposition is evidently highly destructive, causing extensive fragmentation which has a significant impact on quantification.

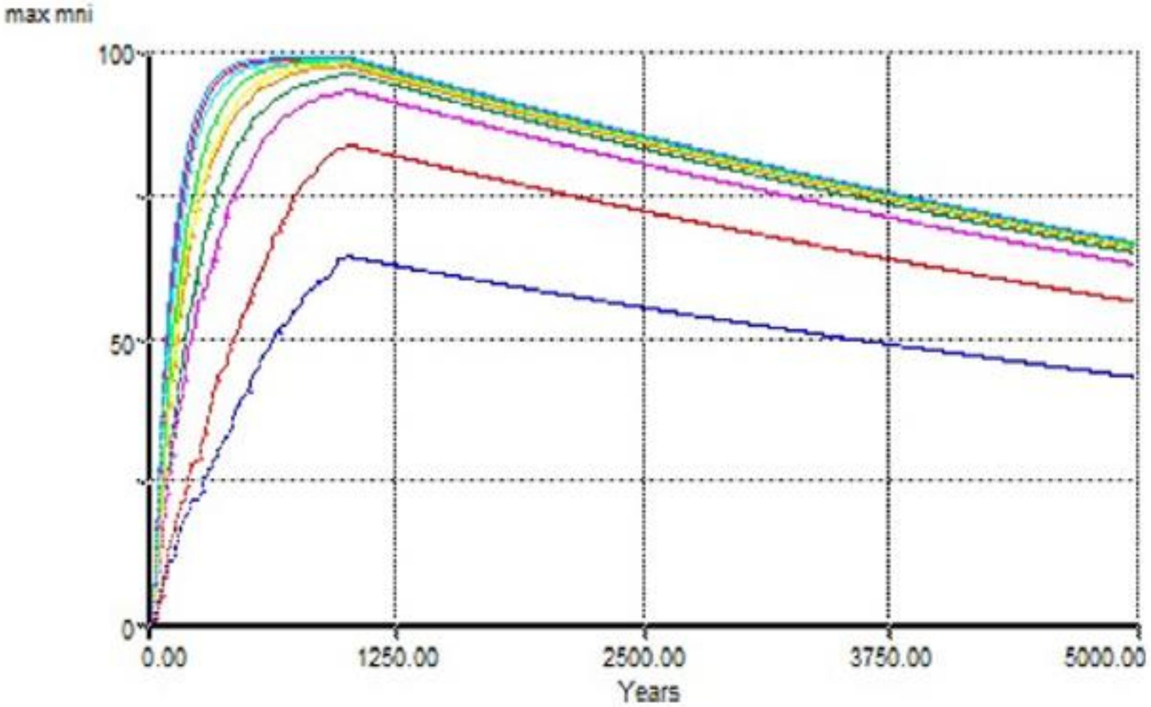


Figure 5.18: Results of simulating destruction from successive burials (1%) and *in situ* degradation (1% per century); the bottom line represents 10 burials per century (100 burials total) and the top line 100 burials per century (1000 burials total). Reprinted from *Journal of Archaeological Science: Reports* 10, J. Robb, 'What can we really say about skeletal part representation, MNI and funerary ritual? A simulation approach', page 689, copyright 2016, with permission from Elsevier.

This study provides a cautionary tale on the strength of inferences that can be made from MNI. Several methods employing metric data and statistical modelling have been developed to overcome these problems. When long bone pair-matching and fragment conjoining is possible, a statistical formula may be used to estimate the Most Likely Number of Individuals (MLNI)

(Adams and Konigsberg 2004). However, even with high recovery rates, MLNI continues to underestimate the original population. Osteometric sorting (Byrd 2008; Byrd and Adams 2003; Byrd and LeGarde 2014) proceeds on the null hypothesis that two elements of consistent size should originate from the same individual. Algorithms for pairing elements and estimating the original number of individuals often employ measurements which cannot be taken on fragmented remains (e.g. maximum length) (Nikita and Lahr 2011). Even metric analyses which account for fragmented remains cannot be applied when preservation is poor, as cortical abrasion and damage, as well as pathology, all impede accurate measurement (Byrd and Adams 2003, 7). As such, their applicability to many archaeological assemblages is limited, principally due to the difficulties associated with confident pair-matching.

As MNE and MNI can be derived a multitude of ways, it is generally best practice to describe how they have been calculated. In addition to calculating MNE and MNI for each element, it may also be calculated separately for males and females, adults and nonadults, and for each archaeological context. The choice of whether to aggregate contexts substantially affects the total, as summing the remains across all contexts will decrease the MNI (Lambacher *et al.* 2016, 678). These calculations are also affected by laboratory practices. Laying out the full assemblage and attempting conjoining exercises and pair matching should increase the total, compared to when bones are analysed individually. Results thus vary by analyst and method even within a single assemblage (Robb 2016, 685).

In this study, MNE and MNI have been calculated differently for each site. At the Xagħra Circle, remains have been quantified on a context-by-context basis. However, the assemblage from the Xemxija Tombs has been aggregated (as discussed in Chapter 4) requiring the assemblage to be treated as one deposit. Both methods are problematic: secondary redistribution of remains across archaeologically-defined contexts is extremely likely at the Xagħra Circle and may result in double counting, whereas suppression of the MNI is probable for the Xemxija Tombs assemblage. Additionally, pair-matching and conjoining have not been attempted due to time constraints, curation methods and—above all—high fragmentation.

MNE was calculated in aggregate for each site/context, taking into account age and sex. For each skeletal element or region (e.g. vertebrae were grouped according to region, metacarpals and metatarsals were grouped, and manual and pedal phalanges were also grouped), MNE was calculated by only including fragments which represented ≥50% of the element. Of these fragments, age estimations were then considered to ensure nonadults were represented, as they frequently demonstrated the preservation of different zones compared to adults. The most frequently occurring zone was taken to represent the MNE and was cross-referenced with the zones present for each nonadult age category. Cranial bones were quantified individually, accounting for side, and the most frequently occurring bone which was ≥50% complete represented the MNE. Paired long bones were quantified for each side, and elements which could not be identified to side were also accounted for. For example, if there were 39 left humeri ≥50% complete within a context, 35 of these were scored for the presence of the distal epiphysis but all proved to be adult, and there were 3 children with humeral diaphyses recorded, 38 is the MNE for left humeri. This process is then repeated for right humeri, and humeri fragments which could not be allocated to side. For each element, the MNI for each category is noted. Once this process is completed for all elements, the highest MNI count for each age group is summed to produce the total MNI.

5.5.2 Skeletal element representation

Skeletal element representation (SER) is a measure of the proportion of elements present (MNE) with reference to the total estimated population (MNI). In this study, SER was calculated using the Bone Representation Index (BRI). For each skeletal element, the MNE is divided by the expected number if all skeletal elements of the total MNI were present (following Dodson and Wexlar 1979):

BRI= (MNE)/(number of elements in complete skeleton x MNI) x 100

For elements which only occur once (e.g. mandible, sternum, sacrum), the MNE is directly divided by the MNI. For paired elements, or regions of bones (e.g. carpals/tarsals, lumbar vertebrae), the total number of bones in each region per skeleton is multiplied by the MNI. For example, there are 10 metacarpals in each body, and if 19 metacarpals are present in a context containing 20 individuals, the MNE of 19 is divided by 200 (BRI=9.5%).

Although this method has been critiqued for implying that all elements should ideally be equally represented (Robb 2016, 692), it provides a useful tool for inter-site analyses. Through SER, relationships can be explored between sites displaying different lengths of use, environmental conditions and cultural practices. Taphonomic processes which may be responsible for differential preservation can be examined through, for example, comparing the presence of elements of high and low density. SER is a powerful tool for analysing funerary practices and provides a series of expectations for element representation based on different modes of deposition (Table 5.5).

Simulation modelling, discussed above, has critically evaluated assumptions commonly made about element representation, arguing that they are often too simplistic and do not account well enough for taphonomic destruction (Robb 2016). Primary depositions, if left undisturbed, are only subject to natural degradation which affects less robust bones (especially the sternum and *ossa coxae*) and can result in low numbers of small bones (notably of the hands and feet).

A lack of fragile elements and small bones therefore does not always indicate secondary deposition. Secondary rites encompass a wide range of practices, including the disturbance of primary depositions and the selection of certain elements for removal or display. Most of these practices are subject to natural and cultural processes of degradation, such that it is difficult, through skeletal part representation alone, to untangle secondary practices from multiple successive inhumation (Robb 2016, 689–690). This is a serious limitation and serves as a reminder that taphonomic data must be analysed holistically. Secondary deposition may be indicated more clearly if specific elements are selectively over-represented (Robb 2016, 690). For example, a residual profile, suggestive of removals of some of the larger bones, may be indicated if elements which are commonly degraded are equally or over-represented in comparison to long bones and crania. Providing a means to analyse patterns in cultural practices, skeletal part representation is one of the key ways in which skeletal data can be analysed to align with the goals of funerary taphonomy.

Funerary practice	**Expected skeletal element representation**	**Examples**
Primary deposition	Most skeletal elements expected to represent 100% of MNI, but *in situ* decay of elements high in trabecular bone (e.g. sterna and *ossa coxae*) likely to suppress their number, and small bones may not be recovered (Robb 2016, 690).	Single graves or simultaneous mass burials such as massacre and plague pits.
Secondary deposition	Uneven profile with under-representation of small bones due to movement from original place of burial, especially of labile joints (Robb 2016, 690). Two types of deposits can sometimes be distinguished: selection of bones, and residual assemblages.	Ossuaries used as repositories for exhumed remains, such as charnel houses.
Multiple successive inhumation	Both *in situ* decay and biased representation of small and fragile bones is likely. Small bones often fall to base of deposit, and fragile bones may be crushed by later depositions. Results likely to be very similar to that for secondary deposition (Robb 2016, 689).	Common in European prehistoric tombs used for collective deposition.
Reduction	Related to secondary deposition but defined as the clearance of remains for successive inhumation. Difficult to distinguish from SER, but since it is usually spatially discrete, evidence for reduction is best found through spatial analysis of skeletal elements (Duday 2009, 72).	Distinguished in some prehistoric collective burial spaces, and in the re-use of graves for later interments.
Selection or curation	Cultural selection of specific elements for curation and display will result in their over-representation within a typical element representation curve for secondary deposition (Robb 2016, 690).	Curation of crania common in prehistory, alongside emphasis on long bones in some prehistoric tombs.
Residual assemblages	Bones remaining from a primary deposition after elements have been moved for secondary deposition or selected for curation. Produces an uneven and inconsistent SER profile. Commonly identified through over-representation of small elements. The result is the inverse pattern to typical secondary deposition or bone selection (Robb 2016, 690).	Remains from primary disturbed burials, e.g. Poulnabrone Neolithic tomb (Beckett 2011).

Table 5.5: Examples of typical funerary practices and their expected skeletal part representation (collated from (Duday 2009 and Robb 2016).

5.5.2.1 Comparative sites

SER data was collated for comparative sites (Table 5.6) to provide 'control' signatures of single and multiple interment practices in contexts ranging from the early Neolithic to post-Medieval period (see Appendix 1.2). In addition to representing a range of funerary practices, these sites were analysed using similar methods to those employed in this research. As such, although varying quantification results are expected due to inter-observer differences (discussed above), these comparative data allow reasonably strong inferences to be made regarding the classification of depositional modes at the Xemxija Tombs and Xagħra Circle.

Site	**Period/ date**	**Inferred funerary practices**	**References**
Tinkinswood (Wales)	Early Neolithic	Chambered tomb with disturbed primary interments and bone removal.	Thompson 2019.
Poulawack (Ireland)	Early Neolithic–Bronze Age	Cairn with primary interments and bone removal/disturbance.	Beckett 2011.
Parknabinnia (Ireland)	Early–Middle Neolithic	Chambered tomb containing successive primary interments.	Beckett 2011.
Poulnabrone (Ireland)	Early–Middle Neolithic	Portal tomb with primary interments and bone removal.	Beckett 2011.
Quanterness (Orkney)	Middle–Late Neolithic	Chambered tomb with primary interments and disturbance (defleshing and fragmentation).	Crozier 2018.
Scaloria Cave (Italy)	Middle Neolithic	Cave used for secondary deposition of complete and partial bodies.	Robb *et al.* 2015.
Kunji Cave (Iran)	Early Bronze Age	Cave used for primary interments which were disturbed, and secondary deposition (especially of crania)	Emberling *et al.* 2002.
Non Pa Wai (Thailand)	Bronze Age	Deposit of human remains in non-burial context, possibly representing secondary deposition.	Robb unpublished.
Nanjemoy (US)	Late Woodland (16th century)	Ossuary used for secondary deposition.	Ubelaker 1974.
West Tenter St. (London)	Roman	Cemetery.	Waldron 1987.
Wharram Percy (Yorkshire)	Medieval	Cemetery.	Mays 2007.
Christ Church, Spitalfields (London)	Post-Medieval	Crypt containing single interments.	Bello and Andrews 2006.

Table 5.6: Summary of comparative sites.

5.6 Data collection and analysis

Within the NMA, the human remains are stored in archive boxes which are individually numbered, labelled according to context number, and spread across three rooms. The boxes in each room (and the context numbers labelled on each box) are recorded on a database, facilitating this study's targeted sampling strategy. Specimens which have been isolated for analysis during the FRAGSUS project have been removed from their original boxes and re-located in the laboratory; this was recorded and labelled on the relevant boxes and noted in the FRAGSUS database. During this research, note was made of every bag or box from which specimens had been removed as part of the FRAGSUS isolation phase; these were then located within the FRAGSUS storage system and recorded to ensure full sampling of the original contents. Each box analysed during this research has been clearly labelled.

All bone fragments included in this study were examined macroscopically, and modifications were viewed under a hand lens. Possible cut marks and gnaw marks were further examined using digital microscopy (Dino-Lite AM4113ZT, with 10–60x and 200x magnification) and light microscopy (up to 100x magnification). Each bag of skeletal remains was divided into identifiable and unidentifiable fragments. Unidentifiable fragments were sorted (cranial bones, long bones and miscellaneous bones, further divided by size and preservation level) and counted. Fragments smaller than 5 mm were not included. Following this, each fragment (or group of unidentifiable fragments) was entered into an Access database (Figure 5.19).

The human remains data is split over two tables, 'bone census' and 'bone taphonomy', which are linked by the primary key from the 'bone census' table. The primary key assigned a unique number (fragment ID) to each fragment, or group of similar fragments. A query was set up for data entry including fields from both tables. A series of identifying information was entered alongside each fragment: site, context, grid square, spit (level), excavation season, shelf number and box number. Each of the features described below (Table 5.7) were then coded. Most features were inventoried numerically, with further information entered in either the post-mortem modification column or notes column. The numerical coding system is detailed in Appendix 1.3

Statistical analysis was carried out in SPSS v.25. Descriptive statistics were used to test the normality of data and non-parametric tests were employed for data which were not normally distributed. Spearman's rank order correlation was used to test the relationship between variables which did not violate the assumptions of linearity and homoscedasticity. SER data were analysed using hierarchical clustering (Aldenderfer and Blashfield 1984).

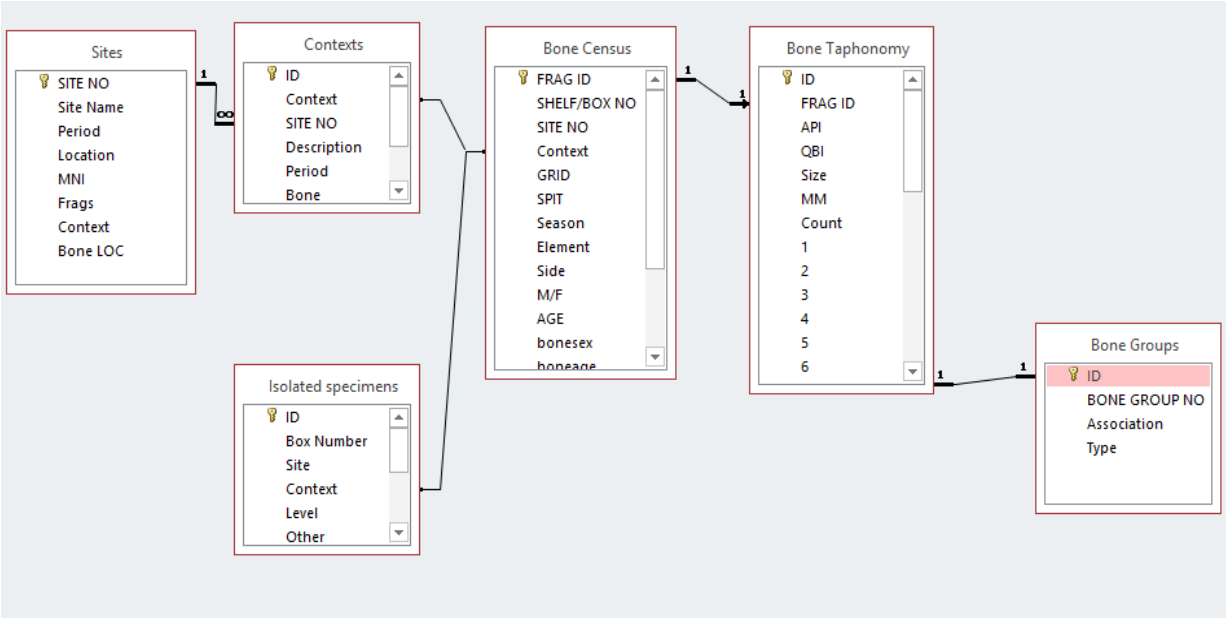


Figure 5.19: Relationships between tables in the Access database created for this study.

Category	Description	Reference
Anatomical Preservation Index (API)	The percentage of the element represented by each fragment.	Bello 2005.
Qualitative Bone Index (QBI)	The percentage of the cortical surface preserved well.	Bello 2005.
Fragment size	Identifiable fragments are measured to maximum length in mm. Unidentifiable fragments are grouped in size classes.	Knüsel and Outram 2004.
Zones present	Each element is divided into zones and the zones represented by each fragment are recorded. For example, a complete cranium has 13 zones, and a complete long bone has 5 zones.	Buikstra and Ubelaker 1994; Knüsel and Outram 2004.
Fragmentation morphology	The Fracture Freshness Index records angle, outline and texture on a scale of 0–2 (where 2 is consistent with a dry bone fracture). When different types of breaks are evident on one fragment, the earliest break is recorded.	Outram 2001.
Abrasion	Surface abrasion or erosion, such as that due to root damage (recorded on a scale of 0–5).	McKinley 2004a.
Weathering	Damage consistent with exposure to the elements, usually in the form of splitting and flaking of the bone surface (recorded on a scale of 0–5).	Behrensmeyer 1978.
Discolouration	The colour, size, and location of cortical staining or adhesions.	
Animal activity	Recorded as either rodent, carnivore, herbivore or insect damage.	Haglund 1997a; Haglund 1997b; Huchet *et al.* 2013.

Table 5.7: Taphonomic observations recorded in the database.

Burning	The colour, location and extent of thermal damage is recorded.	McKinley 2004b.
Cut marks	The number, location and morphology of cut marks is described.	Greenfield 2006.
Excavation damage	Tool damage resulting from excavation.	
Bone Number	Relating to excavation records, a bone number which cross-references with plan drawings has occasionally been written on the finds bags. This has been recorded to facilitate analysis of articulation when the *in situ* of position of elements can be identified from excavation plans or photographs.	

Table 5.7 (continued): Taphonomic observations recorded in the database.

5.7 Putting the pieces together

Taphonomic analysis of the Xemxija Tombs and Xagħra Circle assemblages was implemented to address several questions:

1) What was the range of funerary practices employed at these sites?
2) At what stage post-mortem were the dead disarticulated, manipulated and redistributed?
3) Is there any chronological or spatial patterning in funerary practices?

These necessitate beginning with identification at the level of the individual fragment, building up to analysis of demography and skeletal part representation on a context-by-context basis. Each site and assemblage has its own biases and limitations (see Chapter 4), requiring a flexible methodology to allow their comparison. Some methods may be less informative for some contexts, or for one site, but the results are used—alongside knowledge of the archaeological context—to bring together an overall interpretation of funerary practices at each site (Knüsel and Robb 2016, 667).

Until this study, skeletal part representation has only been applied to the Xagħra rock-cut tomb (see Figure 4.19). Comparing results from both Xagħra and Xemxija with element representation curves from other sites with known practices (cf. Robb *et al.* 2015, 45), will facilitate categorising modes of deposition at each site. Careful assessment of taphonomic modifications and the *in situ* position of skeletal remains (at Xagħra) is crucial for discerning the temporality and sequence of depositional and post-depositional interactions with the dead. Finally, comparing both sites, which span a similar length of time from the mid-4th to mid-3rd millennia BC, contributes to a longue durée examination of funerary practices.

CHAPTER SIX

RESULTS I: XEMXIJA TOMBS

6.1 Overview

This chapter presents the full results of the taphonomic analysis of the Xemxija Tombs assemblage. The complete assemblage of human remains, comprising eighteen archival boxes, was recorded and analysed following the methods set out in Chapter 5. Due to the size of the assemblage, time constraints meant that most remains could only be viewed once. The NISP, MNI, and demographic structure of the assemblage are outlined first, followed by the results of all recorded taphonomic variables. As all human remains were aggregated following excavation, it is impossible to account for the MNI of each tomb and this estimation is certainly an under-representation. Reporting of the overall preservation and condition of remains, and the relative representation of skeletal elements, significantly updates the present state of knowledge.

6.2 Quantifying the assemblage

In Pike's (1971b) original analysis, just over 12,000 fragments were inventoried, of which more than 1,000[3] were unidentifiable to element. In this research, 14,760 fragments were inventoried. More unidentifiable fragments were recorded, likely due to a lower fragment size threshold, although further fragmentation of some bones during curation is likely. More secure element identifications have also been made; primarily a zooarchaeologist, Pike aggregated metacarpals and metatarsals, carpals and tarsals, and all phalanges in her inventory and it has since been possible to identify many of these to element.

With all elements identified from this study represented as a percentage of the total (Figure 6.1), the composition of the assemblage differs slightly to the original study (Figure 4.5). Compared to the original inventory, cranial and vertebral fragments comprise a lower proportion of the assemblage, the number of femoral fragments has doubled, and unidentifiable fragments have also increased (subdivided into long bone, miscellaneous and vertebral fragments). Due to their high susceptibility to fragmentation, cranial and rib fragments are numerous (comprising more than 12% and 10% of the assemblage, respectively). Conversely, identifiable long bones are low in representation, with each long bone representing only 1–3%

[3] The published total of unidentified long bone fragments is 1,335 (Pike 1971b, 237), although in Pike's original notebooks a total of 1,447 unidentifiable bones are recorded (including long bones and other elements).

of the assemblage. Unidentifiable long bone fragments comprise more than 16% of the assemblage, evidencing their high fragmentation and suppressing their overall representation.

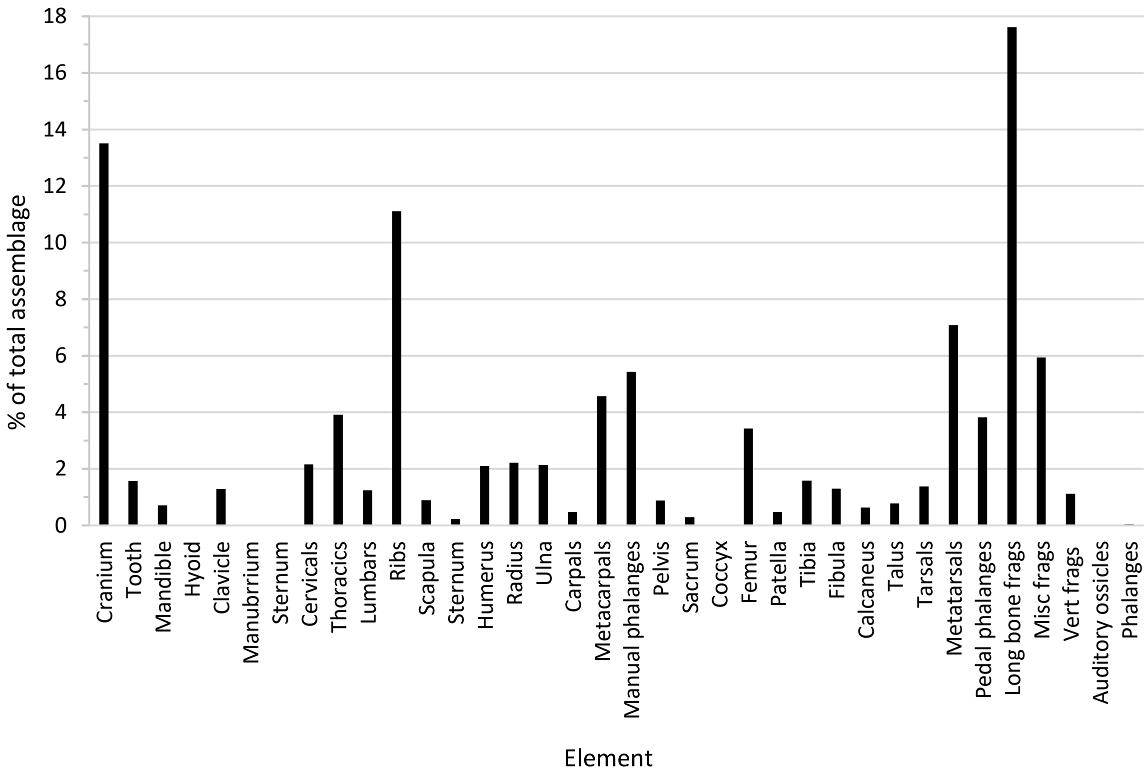


Figure 6.1: Frequency of skeletal elements identified in the Xemxija assemblage.

6.2.1 NISP and MNI

From a total of 14,760 fragments, 9,836 fragments were identifiable to element and the remainder (33%) cannot be identified to element. Many unidentifiable fragments derive from crania or long bones, ranging from 5–112 mm in maximum length. Nearly all skeletal elements are present in the assemblage (including two auditory ossicles), although many intracranial elements appear absent or are unidentifiable due to fragmentation (including the palatines, vomer, nasal conchae, ethmoid and lacrimals), and small/fragile bones such as the sternum, coccyx and hyoid were few in number.

A minimum of 112 individuals was identified, including 80 adults and 32 nonadults from foetal to adolescent age (Table 6.1). The most abundant adult element was the right third metatarsal, of which 80 elements with both proximal epiphyses and diaphyses were ≥50% complete. Due to the extent of fragmentation, nonadults may be under-represented; remains of foetal to child age are likely to degrade faster than adult remains, and adolescent remains may be mistaken for adults (see §5.5.1). The MNI for each age category was produced from a small range of elements. For nonadult individuals, age categories were assigned through reference to metrics (Schaefer *et al.* 2009) and employing seriation when possible.

Age	Element	Side	MNI
Foetal (under 40 weeks)	Clavicle; Sphenoid; Femur	-	1
Perinatal (38–42 weeks)	Femur	Left	10
Infant (1 month–1 year)	Femur	Left	9
Young child (1–8 years)	Humerus	Left	5
Old child (8–14 years)	Clavicle	Right	3
Adolescent (14–18 years)	Clavicle and MT1	Left	4
Adult (18+ years)	MT3	Right	80

Table 6.1: MNI calculations for each age category within the Xemxija Tombs assemblage.

Extrapolating from the MNI to account for the total number of bones within a skeleton,[4] an expected NISP of 23,584 fragments was calculated. Compared to the actual NISP, this suggests that only 41.7% of the remains from 112 individuals are represented (Table 6.2). Given the inherent under-estimation of the MNI, it is likely that the preservation of the original burial population is even lower than this figure indicates. The low level of preservation likely reflects the destructive process of successive deposition within small tomb chambers, resulting in extensive *in situ* degradation (Robb 2016). MNE calculations demonstrate the best represented elements are metatarsals, metacarpals, ulnae and tali (Table 6.3). Due to the extent of fragmentation, the Fragmentation Index (NISP/MNE, following Lyman 1994) shows that crania are the most highly fragmented element, followed by sacra, *ossa coxae*, and femora.

MNI	Actual fragments	Unidentified fragments	Expected NISP	NISP	% of expected NISP present
112	14,760	4,924	23,584 20 x 156 = 3120 12 x 332 = 3984 80 x 206 = 16,480	9,836	41.7%

Table 6.2: Expected NISP compared to actual NISP of the Xemxija Tombs assemblage.

[4] Estimates of 156 bones for foetal-infant age individuals and 332 bones within child-adolescent individuals were used, following Lewis (2006, 26) and 206 bones for adult individuals, although it is recognised that numbers are highly variable within nonadult skeletons.

Element	Total	MNE Left	MNE Axial/Unsided	MNE Right	FI
Cranium	2016	-	25	-	80.6
Mandible	106	13	9	14	2.9
Clavicle	193	38	-	36	2.6
Hyoid	3	-	3	-	1
Cervicals	322	-	98	-	3.3
Thoracics	585	-	120	-	4.9
Lumbars	186	-	32	-	5.8
Ribs	1658	152	2	188	5.1
Scapula	134	20	4	16	3.35
Manubrium	8	-	2	-	4
Sternum	33	-	10	-	3.3
Humerus	314	39		34	4.3
Radius	331	27	5	38	4.5
Ulna	319	32	13	40	3.8
Carpals	71	30	6	34	1
Metacarpals	683	249	101	242	1.2
Manual phalanges	810	-	765	-	1.1
Pelvis	132	10		13	17.4
Sacrum	44	-	8	-	18.2
Coccyx	4	-	4	-	1
Femur	511	33	15	28	14.9
Patella	71	26	1	32	1.2
Tibia	236	20	13	16	4.8
Fibula	194	17	3	22	4.6
Talus	117	44	-	39	1.4
Calcaneus	94	7	-	12	4.9
Tarsals	206	45	-	37	2.5
Metatarsals	1058	338	115	341	1.3
Pedal phalanges	570	-	444	-	1.3

Table 6.3: NISP, MNE and FI calculations for each skeletal element.

Finally, loose teeth were quantified and found not to influence the MNI (Figure 6.2). The most commonly recurring adult tooth was the mandibular left first molar (n=17) and the best represented deciduous teeth were the maxillary right canine and left second molar, which were both represented twice. Assuming single rooted teeth will exfoliate faster than multi-rooted teeth in a commingled assemblage such as this, it is expected that exfoliated single rooted teeth would be more prevalent. However, almost equal numbers of exfoliated single (n=113) and multi-rooted teeth (n=115) were present. This may indicate that remains were repeatedly disturbed, for example through handling and moving crania, which would encourage the exfoliation of multi-rooted teeth.

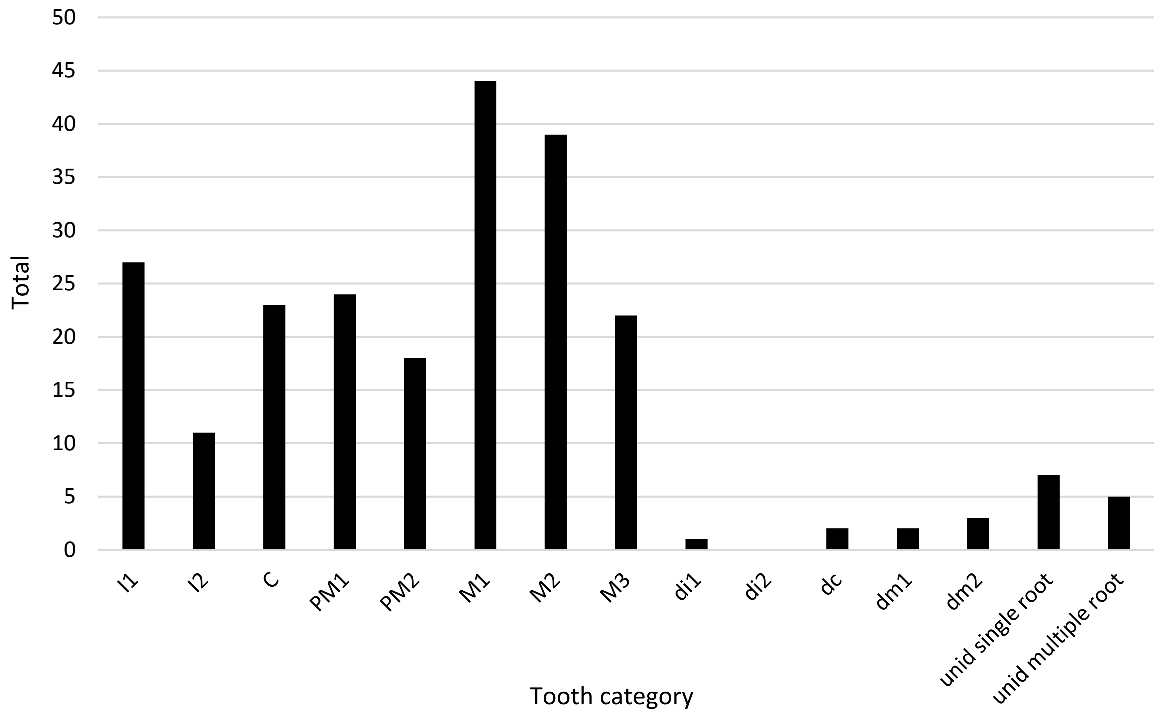


Figure 6.2: Exfoliated teeth categorised by type.

6.2.2 Demography

Adults represent 71.4% of the preserved burial population (Figure 6.3). Among the nonadults, perinatal and infant individuals are particularly well-represented. The limitations of age estimation among adult individuals, alongside high levels of disarticulation, impedes full reconstruction of the tombs' demography. Additionally, demographic changes over time cannot be investigated due to the lack of stratigraphic records.

The presence of foetal, perinatal and infant individuals is notable, although it remains possible that nonadult remains have been adversely affected by taphonomic processes. The representation of nonadults within Tarxien contexts at the Xagħra Circle is estimated at 44% of the MNI[5], while they comprise 28.6% of the Xemxija Tombs. In both cases, infant remains are numerous (Stoddart, Barber *et al.* 2009, 321). This may indicate a peak in mortality among individuals between 1 month to 1 year of age, although may also reflect the increased preservation of infant remains as opposed to foetal and perinatal remains.

Due to the low preservation of *ossa coxae*, it was only possible to estimate the age of several adult individuals. Only one auricular surface and two pubic symphyses were complete and well-preserved but, due to disarticulation, these could only be assessed unilaterally (Table 6.4). At least one sexually dimorphic characteristic was available to score on 60 cranial,

[5] MNI estimations by age category for Tarxien contexts at the Xagħra Circle is: 63 perinates, 122 infants, 156 children, 101 nonadults and 559 adults (Stoddart, Barber *et al.* 2009, 321).

mandibular and pelvis fragments; of these, more than one characteristic was noted on five fragments (Table 6.5). Across these elements, the full range of gracile to robust expressions was observed, indicating the presence of individuals of both sexes.

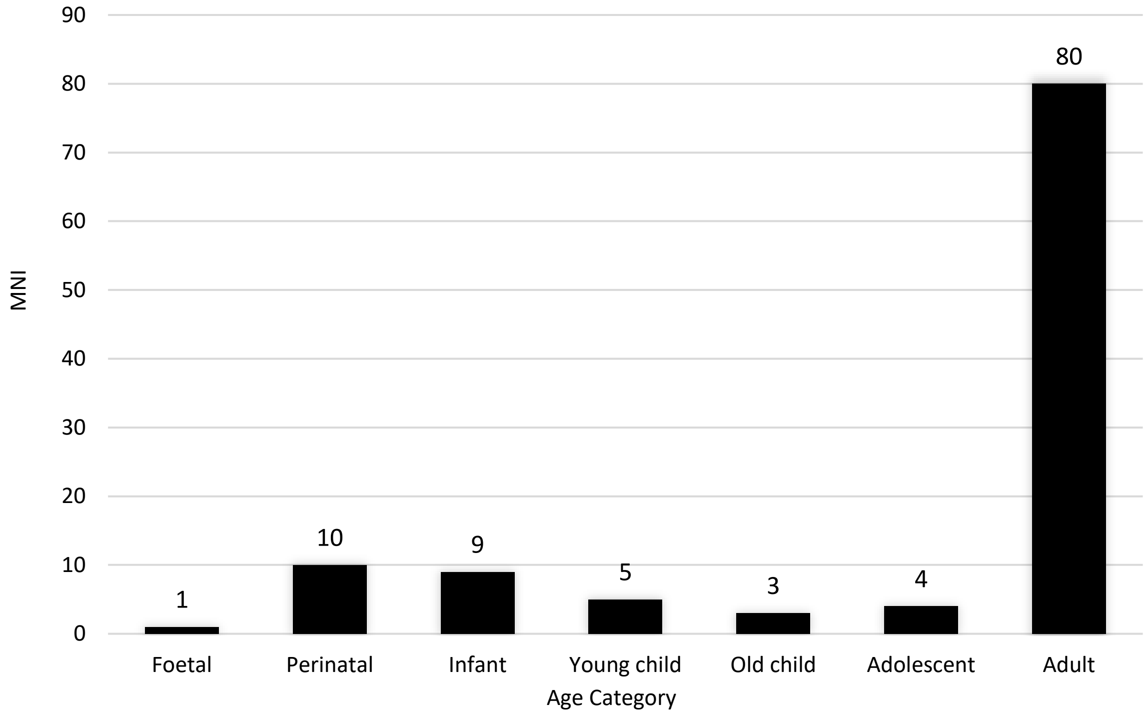


Figure 6.3: Demographic profile of the Xemxija Tombs assemblage.

Frag ID	**Side**	**API**	**QBI**	**Age estimation**	**Age category**	**Sex determination**
5583	Right	1	2	Phase 5, 40–44 yrs (Lovejoy *et al.* 1985)	Middle adult (35–50 yrs)	Greater sciatic notch: 2 (possible female)
6590	Left	1	3	Phase 6, 3–35 yrs (Todd 1920); Phase 3–4, 21–70 yrs (Brooks and Suchey 1990)	Middle adult (35–50 yrs)	N/A
7060	Right	1	1	Phase 9, 44–50 yrs (Todd 1920); Phase 6, 25–83 yrs (Brooks and Suchey 1990)	Old adult (50+ yrs)	Greater sciatic notch: 3 (indeterminate)

Table 6.4: Adult age estimation and sex determination from the *os coxae*.

Frag ID	Side	API	QBI	Supra-orbital margin	Glabella	Sex determination
5143	Right	1	4	5	4	Possible male
5851	Right	1	1	2	1	Possible female
5877	Left	1	0	4	3	Indeterminate
10160	Left	1	2	1	2	Possible female
10161	Left	1	0	4	3	Indeterminate

Table 6.5: Adult sex determination from cranial fragments.

6.3 Taphonomic variables

6.3.1 Completeness, preservation and zonation

Bone fragmentation is high, with most fragments representing only 1–24% of the skeletal element and few bones either almost or fully complete (Figure 6.4). QBI values are more evenly distributed, with most of the assemblage scoring from 1–3 (1–74% cortex preserved) although the cortex is fully preserved on only a few remains. Overall, the mean value for API is 1.89 (std. dev. 1.451) and the mean QBI value is 1.87 (std. dev. 1.630), evidencing the high fragmentation and poor preservation of most of the osseous remains.

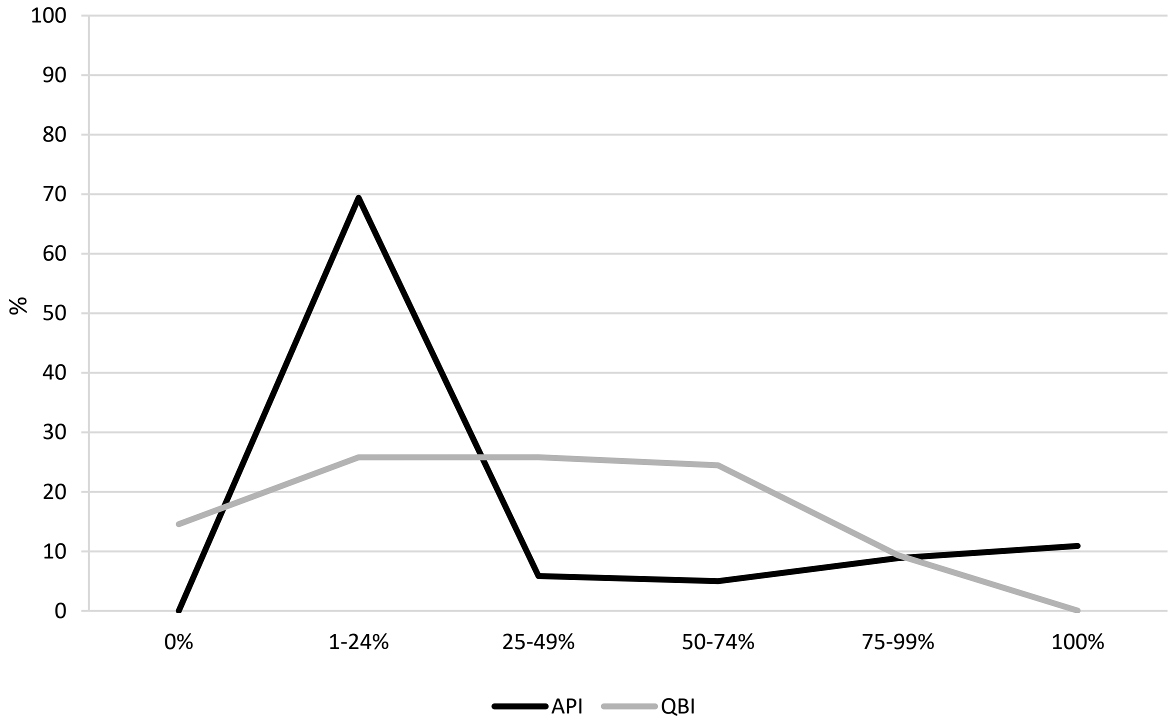


Figure 6.4: Completeness (API) and preservation (QBI) across the assemblage.

Completeness and preservation have been further analysed according to bone type[6]. This reveals that small bones (of the hands, feet and patellae) are the most complete elements in the assemblage, showing the inverse pattern to all other categories of bone (Figure 6.5). In contrast, 80–97% of all other bones are scored as only 1–24% complete. Skull bones and long bones are highly degraded: more than 80% of the sample of these bone types are only 1–24% preserved (Figure 6.6). Conversely, the total of vertebrae, hands and feet, and flat/irregular bones increases across the scale, peaking at 74–99% preservation. Bones which are highly fragmented and identifiable to category—namely, crania and long bones—are similarly poorly preserved. Bones with a high proportion of trabeculae, categorised as 'miscellaneous' bones, cannot be accounted for in this analysis. Elements of the appendicular and pelvic girdles, and the axial skeleton, although irregular in shape and with less dense cortical bone, show slightly better overall cortical preservation.

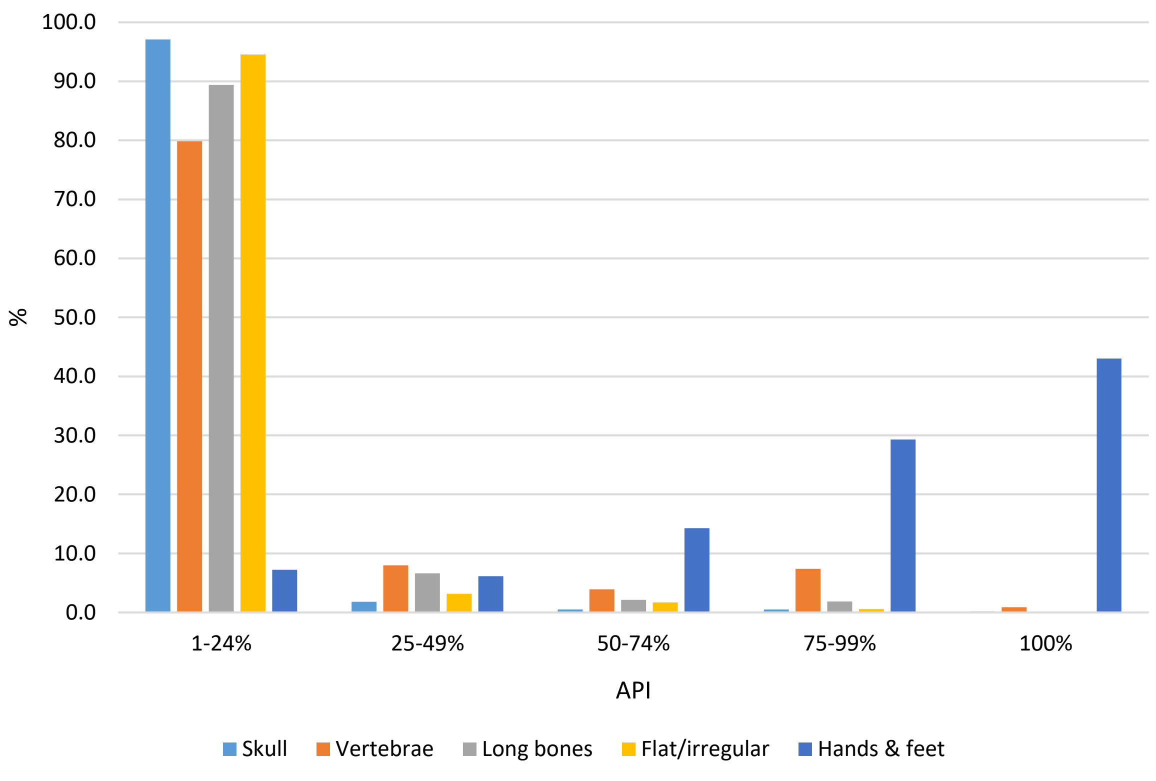


Figure 6.5: Completeness according to bone type.

[6] Bone type has been categorised according to the parameters used by Robb (2016, 690) to compare to the expectations used to model bone destruction. 'Skull' bones include the cranium and mandible, 'vertebrae' include the cervical, thoracic and lumbar vertebrae, 'long bones' include the clavicle, humerus, radius, ulna, femur, tibia and fibula, 'flat/irregular' bones include the scapula, sternum, *ossa coxae* and sacrum, and 'hand and feet' bones includes all carpals/tarsals, metacarpals/metatarsals, phalanges and patellae. Loose teeth are excluded.

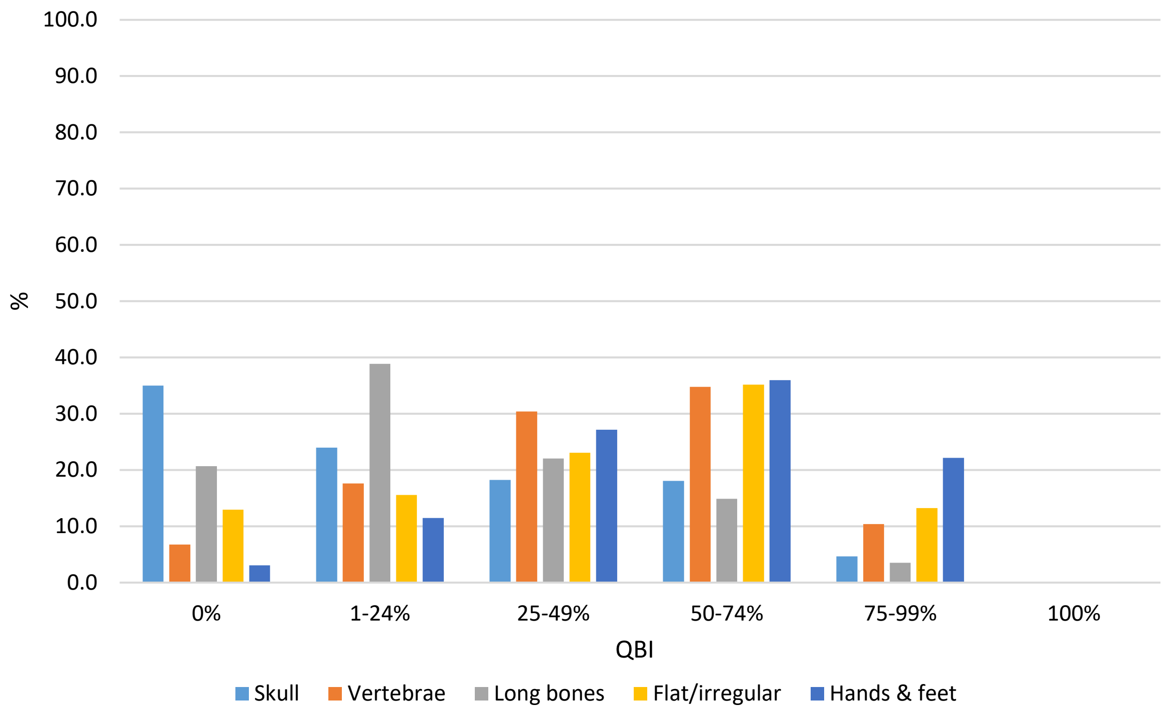


Figure 6.6: Preservation according to bone type.

To compare fragment size, all fragments were categorised in increments (1=1–20 mm; 2=21–30 mm, and so on). Across the assemblage, mean fragment size on this scale was 3.87 mm (std. dev. 2.635), although there were significant outliers (Figure 6.7). Fragments scored as 1–24% complete comprise 72.8% of the sample between size categories 1–4, and most of the remaining elements in this sample comprise small bones of the hands and feet.

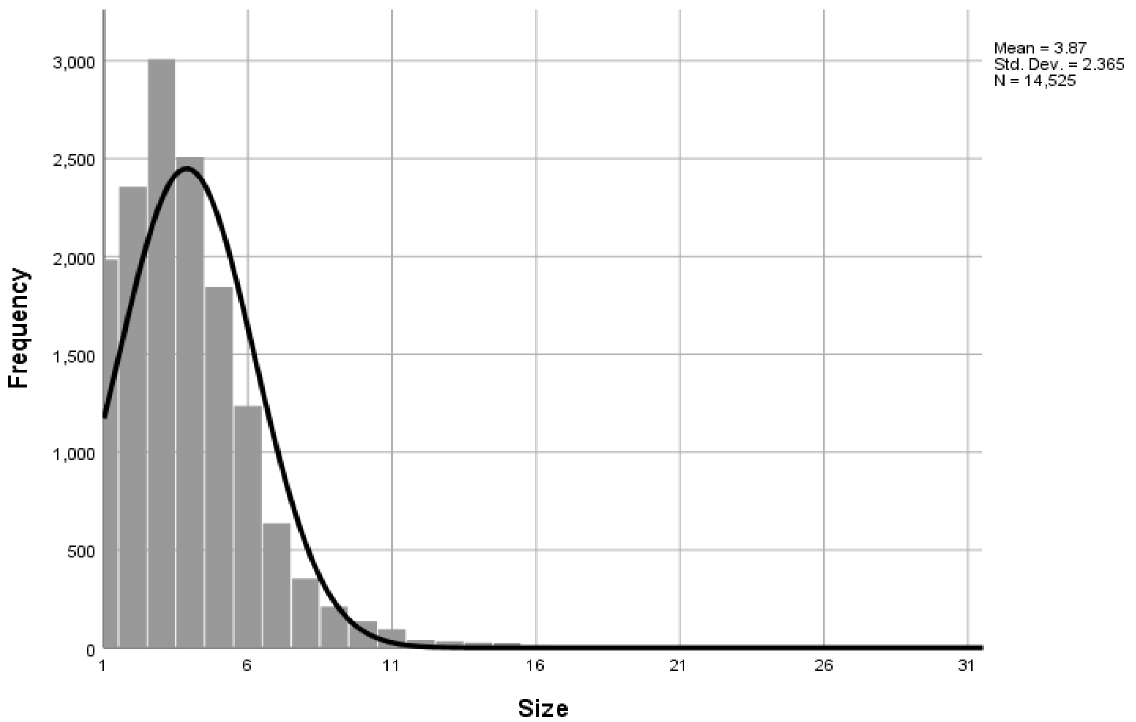


Figure 6.7: Fragment size distribution.

To explore the effects of bone density, long bone preservation according to zone was analysed (Figure 6.8, Appendix 2.4.7). Overall, epiphyses (zones 1 and 5) are poorly preserved compared to diaphyses (zones 2–4). For the humerus, femur, tibia and fibula, the distal epiphysis was better preserved than the proximal epiphysis. Conversely, for the radius and ulna, the proximal epiphysis was better preserved than the distal epiphysis. These results suggest that element preservation is mostly correlated with bone density, although the higher representation of distal femora and tibiae does not correspond with Kendell and Willey's (2014) proxy BMD calculations.

In summary, much of the skeletal material from the Xemxija Tombs is poorly preserved, largely comprising fragments which represent less than a quarter of the original skeletal element. Bone cortices are typically eroded, abraded or obscured. The level of completeness (according to API) is roughly consistent across all bone types, except for hands, feet and patellae. The QBI results suggest slightly better cortical preservation for vertebrae and flat/irregular bones than for skulls and long bones. Preservation within the assemblage, however, seems to be biased according to bone density; vertebral and flat/irregular elements of lower cortical preservation may be absent due to their higher potential for degradation. Therefore, despite accounting for almost one third of the assemblage, preservation bias may have negatively affected the survival of nonadult remains, suppressing their presence.

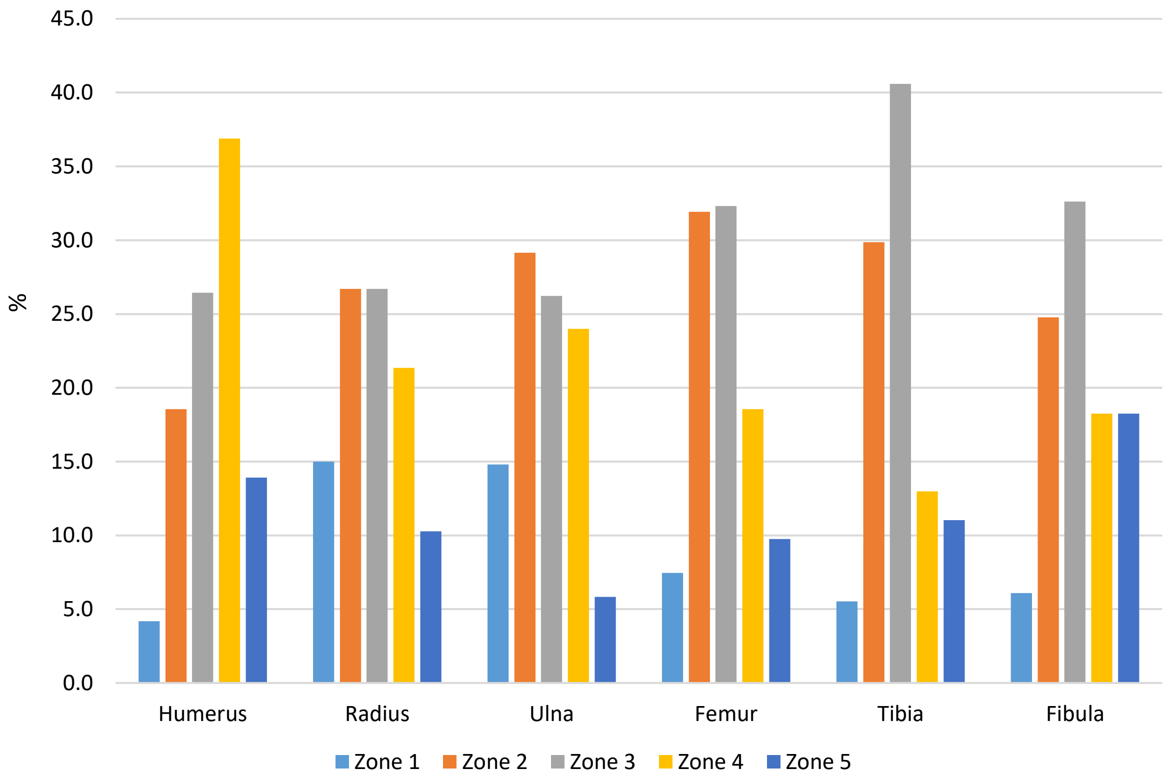


Figure 6.8: Long bone preservation by zone.

6.3.2 Fracture morphology

As detailed above, long bones were highly fragmented. The morphology of long bone breakage was recorded following the Fracture Freshness Index (FFI), described in §5.4.4. Summing the values for each characteristic, the mean total FFI across the assemblage was 5.96 (std. dev. 0.05), and most values ranged from 4–6, indicating fully mineralised, dry bone breakage (Figure 6.9). Excavation damage was noted on 1,155 fragments (7.8% of the assemblage), ranging across many skeletal elements. Of this total, 657 fragments were long bones, and none displayed evidence of earlier breakage in addition to excavation or post-excavation damage.

FFI values of 0–3 were recorded on only six long bone fragments (two femora, two tibiae and two unidentifiable long bones) (Figures 6.10–11). While other fresh breaks may have been obscured by further fragmentation and abrasion of the fracture margins, this very low figure is unlikely to have been highly suppressed by subsequent taphonomic damage. Most fragmentation occurred to fully mineralised, dry bone, producing transverse and stepped fracture margins with either a rough texture, or an edge worn smooth by subsequent abrasion. Most bones were therefore broken and fragmented following skeletonisation and mineralisation, as a result of successive interment, disturbance, and sediment pressure.

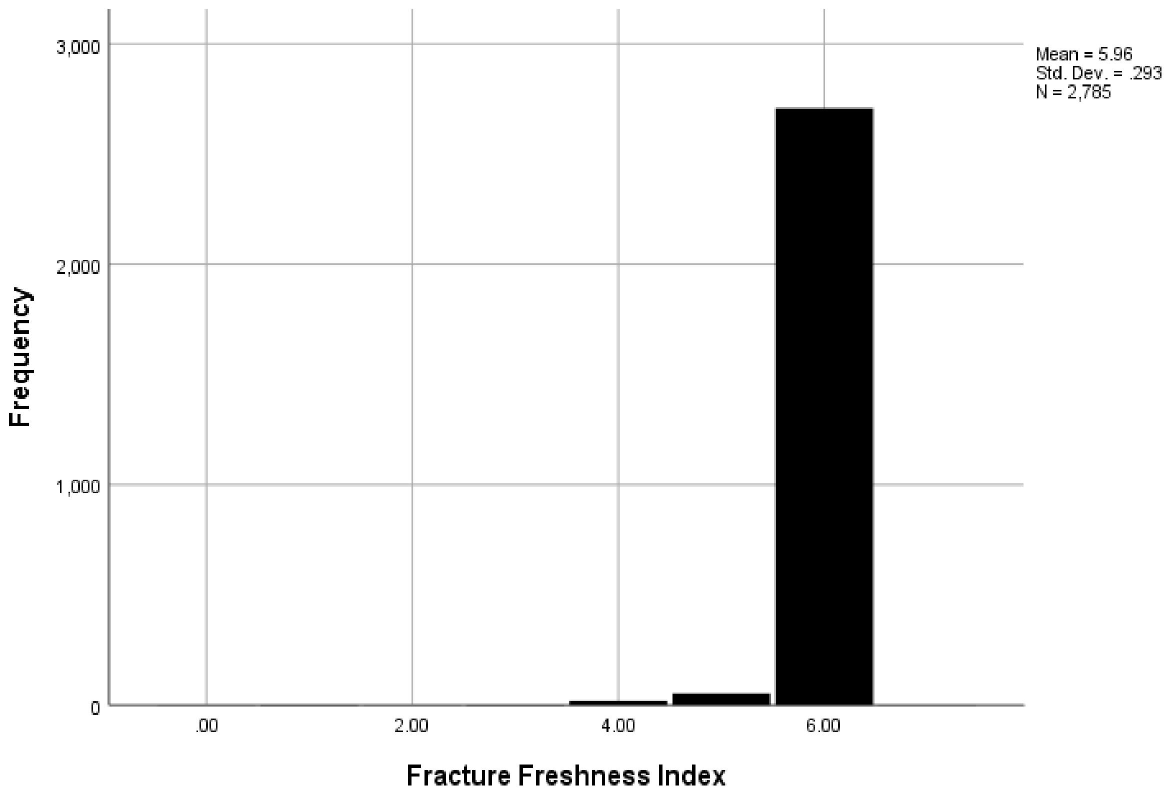


Figure 6.9: Total FFI recorded for long bone fragments.

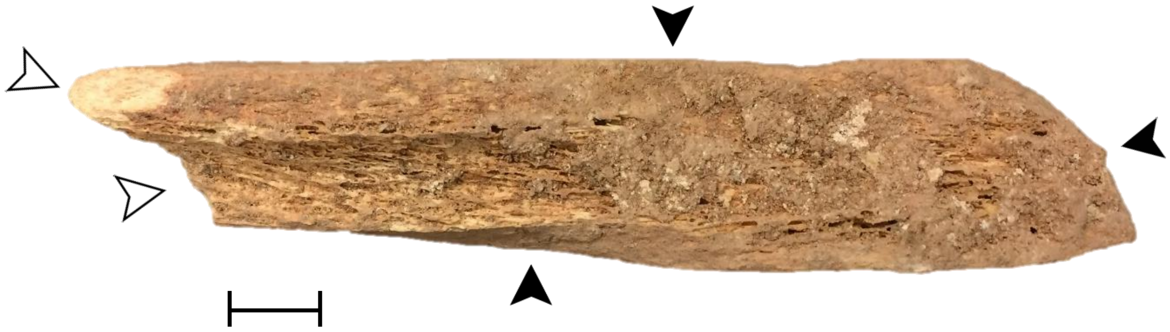


Figure 6.10: Fragment 7961 (tibia), FFI score: 0, indicating fragmentation during peri-mortem interval. Lateral and distal fracture margins present acute angles, spiral outline and smooth texture (black arrows). Proximal fracture margin is likely a later, mineralised break, presenting a rough texture with no discolouration (white arrows). Scale: 1 cm, photo by author.

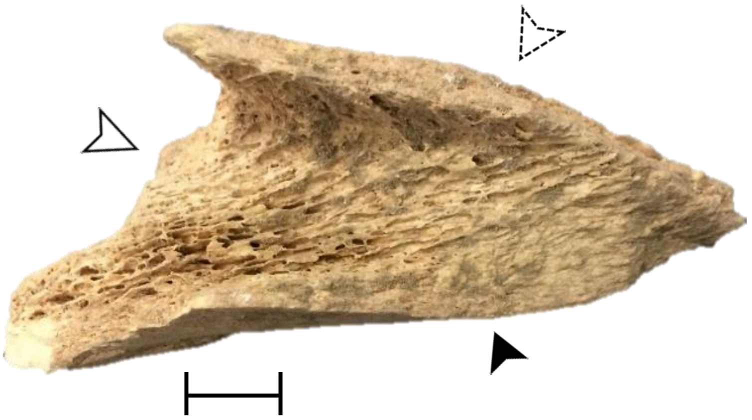


Figure 6.11: Fragment 11229 (femoral neck), FFI score: 1, indicating fragmentation during peri-mortem interval. Medial fracture margin presents acute angle with a spiral outline and smooth texture (black arrow). Lateral fracture margin presents mixed features, with a right-angle outline and slightly rough texture, suggesting breakage before full mineralisation (dashed arrow). Proximal fracture margin presents a transverse and stepped outline with rough margins, the result of a later break to mineralised bone (white arrow). Scale: 1 cm, photo by author.

6.3.3 Weathering

Weathering was observed on 9.1% of the assemblage and the mean weathering score was 0.15 (std. dev. 0.533) (Figure 6.12). As noted in §5.4.5, cortical modifications such as cracking and flaking can be caused by a range of factors in addition to surface exposure, including alkalinity, humidity, moisture, and sediment pressure (Fernández-Jalvo and Andrews 2016, 201). The alkaline environment of the Xemxija limestone plateau may have contributed to some of the cortical defects recorded as weathering, as well as periodic inundation and pressure caused by successive deposition. Additionally, it is unknown whether the tomb entrances were blocked when not in use; it is therefore possible that any remains placed near to the tomb entrance were exposed to processes of weathering.

Of the small percentage displaying cortical cracking and flaking, most scored low (between 1–2), and a variety of skeletal elements are included in this number (Figure 6.13).[7] Skulls and long bones are the most frequently and extensively weathered elements and skulls exhibit much delamination; this is likely due to the thickened cortical bone on these elements (e.g. Figures 6.14–15). These elements are also consistently highly fragmented, and the two processes may be related, with humidity and moisture increasing both the friability and cortical damage of these elements.

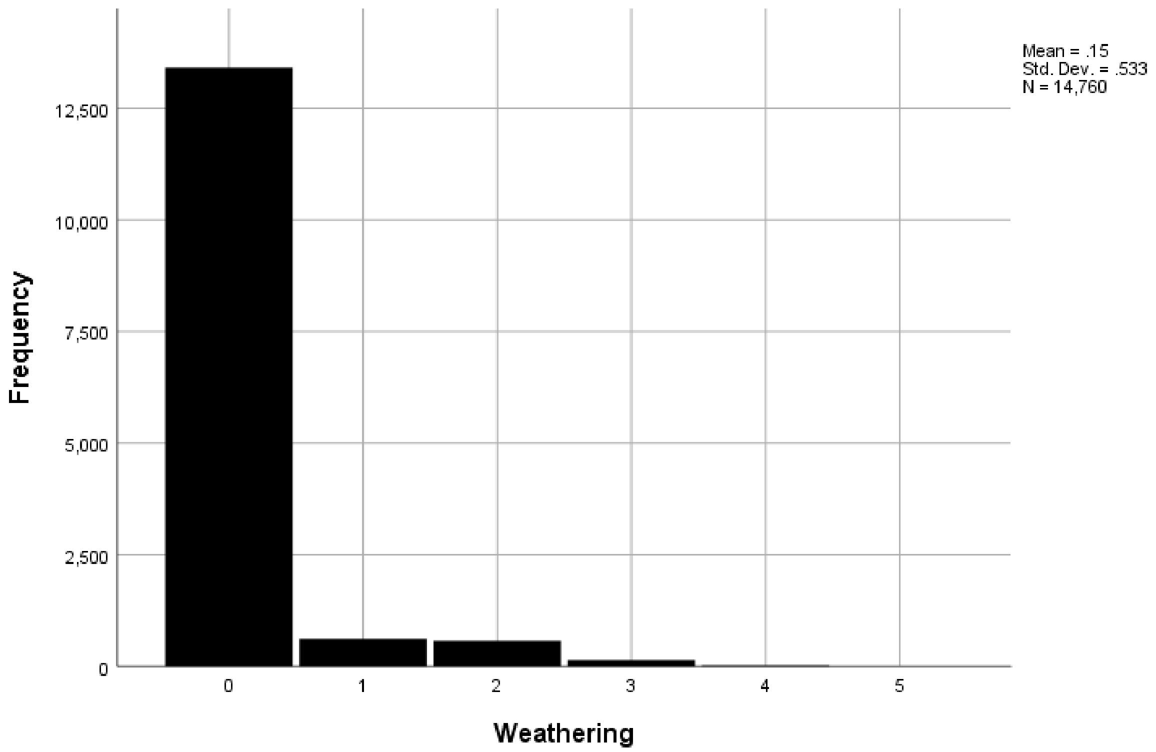


Figure 6.12: Total scores for weathering.

[7] When categorising weathering and abrasion/erosion according to bone type, rib fragments and those classified as ‘miscellaneous’ have been included and grouped in the ‘flat/irregular’ category, in contrast to the protocol used for analysis of bone completeness and preservation, above.

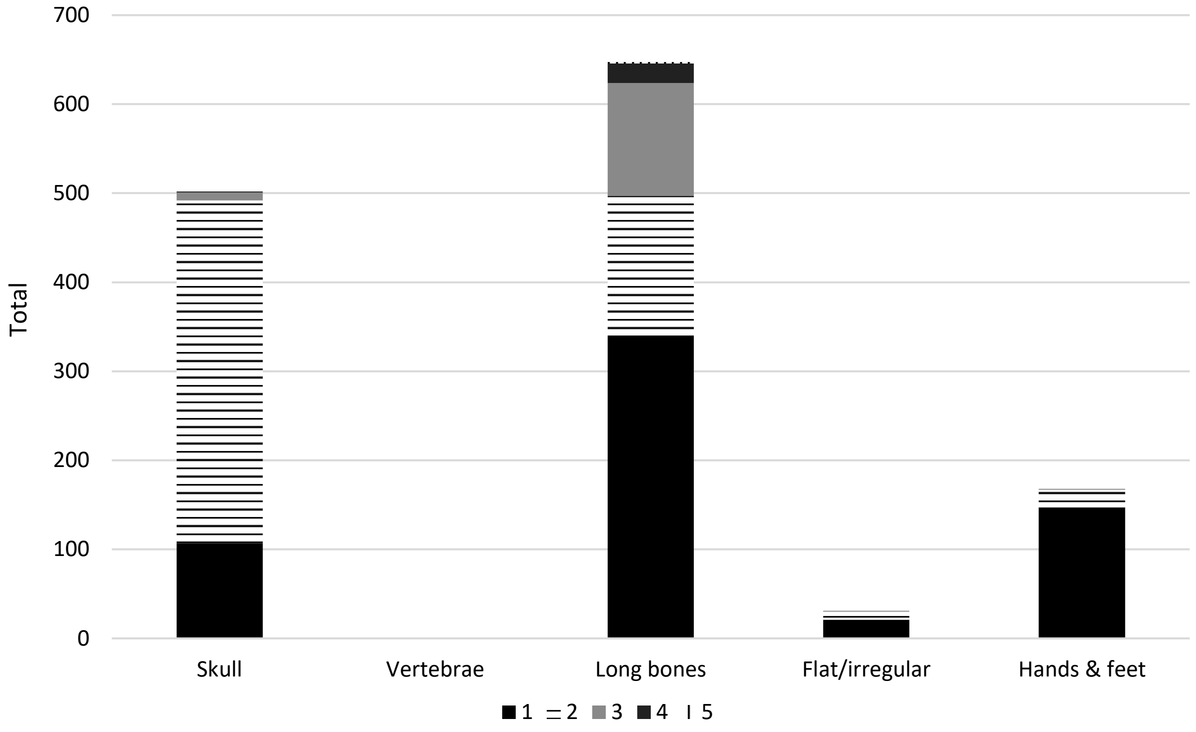


Figure 6.13: Weathering scores divided by bone category.

Figure 6.14: Cortical thinning and splintering (weathering score 4) to fragment 244, distal humerus (left: anterior view; right: posteromedial view). Scale: 1 cm, photo by author.

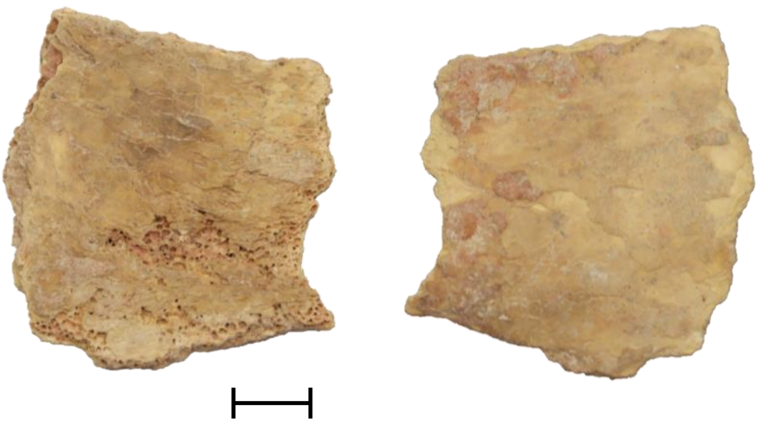


Figure 6.15: Cortical thinning and delamination, exposing the diploë on the endocranial surface (weathering score 2) to fragment 161, cranial fragment (left: endocranial view; right: ectocranial view). Scale: 1 cm, photo by author.

6.3.4 Abrasion and erosion

Abrasion and erosion were present on 15.5% of the assemblage and the overall mean score is low, at 0.30 (std. dev. 0.819). Analysed by bone type, abrasion/erosion displays similar results to weathering (Figure 6.16). Flat or irregularly shaped elements and elements of the extremities display low levels of abrasion/erosion, while skulls and long bones are more frequently and highly abraded and eroded. In most cases, cortical erosion is attributed to root damage, ranging from diffuse and shallow etching, to invasion of the medullary cavity resulting in cortical splitting (Figure 6.17). There was evidently plant growth within the tombs, further indicated by organic staining on some remains (see §6.3.5). Extensive abrasion was noted on 14 fragments, with almost complete loss of the cortex (Figure 6.18). Much abrasion is likely due to tumbling of bones, as successive deposition increased the pressure on underlying remains, and bones moved within the deposit both naturally and through selective rearrangement.

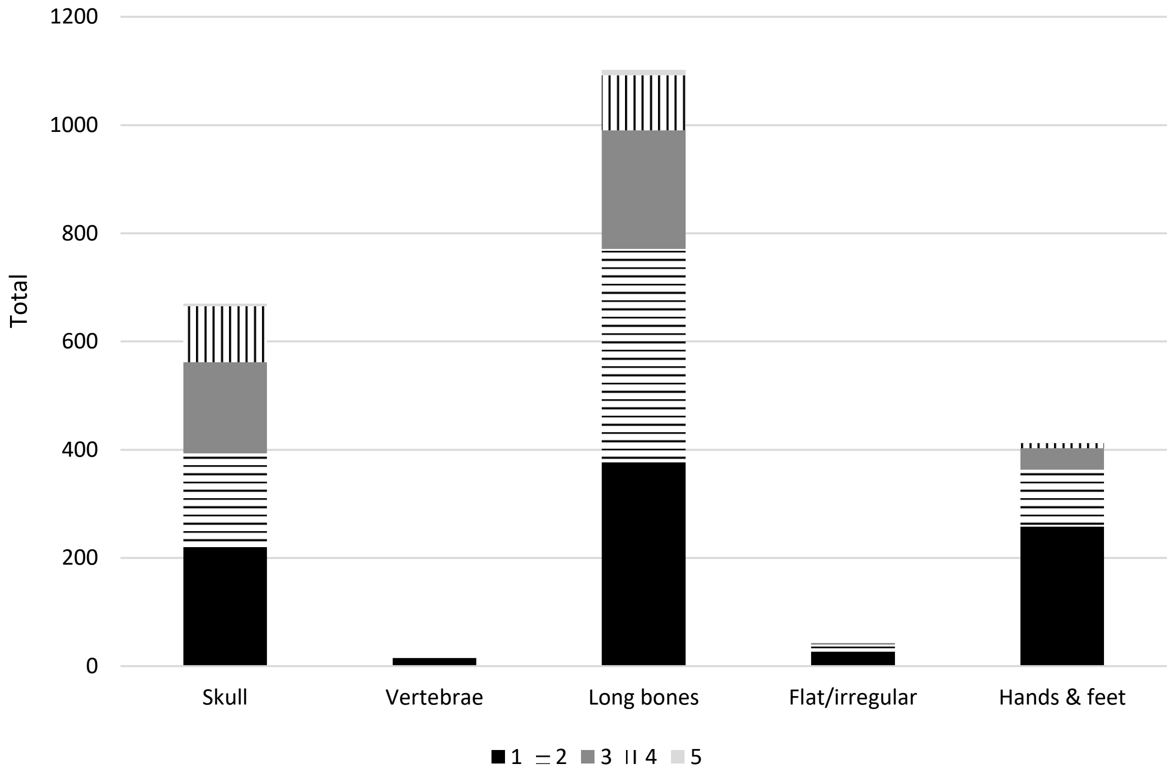


Figure 6.16: Abrasion/erosion scores divided by bone category.

Figure 6.17: Fragment 416, femoral fragment exhibiting longitudinal cortical splitting due to root invasion (score 1). Diffuse light brown staining is evident in patches across the cortex (see top right and bottom left), possibly the result of root staining. Scale: 1 cm, photo by author.

Figure 6.18: Fragment 169, cranial fragment exhibiting almost completely abraded cortex (score 4). Scale: 1 cm, photo by author.

A series of modifications with consistent morphology, presenting as broad linear marks with u-shaped profiles, were observed both across diaphyses and fragmentation margins. These are attributed to *in situ* abrasion and tumbling. The marks are mostly 1–2 mm in width and often occur in groups which may be closely spaced or diffuse across the extant portion of the bone (Figure 6.19). They are both longer and narrower than typical rodent gnaw marks and, significantly, often occur on abraded areas of bone. Linear marks with rounded and worn margins on a humerus fragment (fragment 227) were transverse to the diaphysis on the posterior aspect, as well as on the distal epiphysis (Figure 6.20). In the latter area, the olecranon fossa and the anterior aspect of the distal epiphysis have been fragmented, and subsequent abrasion by hard materials has rounded the superior and lateral margins. In several cases, the striations penetrate cortical defects such as cracking. The abrasive action of bone rubbing on bone, as well as on stones and ceramic sherds within the depositional matrix, resulted in deep cortical defects which exhibit the characteristics of post-mortem damage to dry bone. The margins of the defects are frequently observed to be rounded and worn, associated with cortical flaking and spalling. This abrasion may have been aided and advanced by periodic cycles of inundation, with moisture and humidity undermining the bone quality.

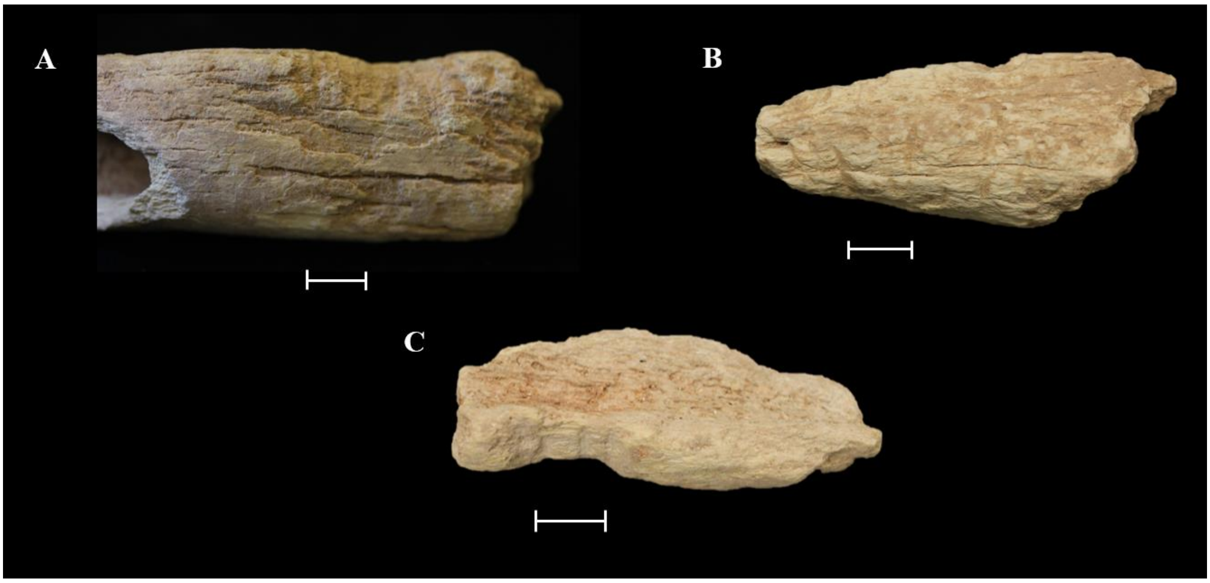


Figure 6.19: Linear marks on abraded bone, attributed to tumbling and abrasion, A: fragment 7245; B: fragment 8891; C: fragment 6254. Scale: 1 cm, photos by author.

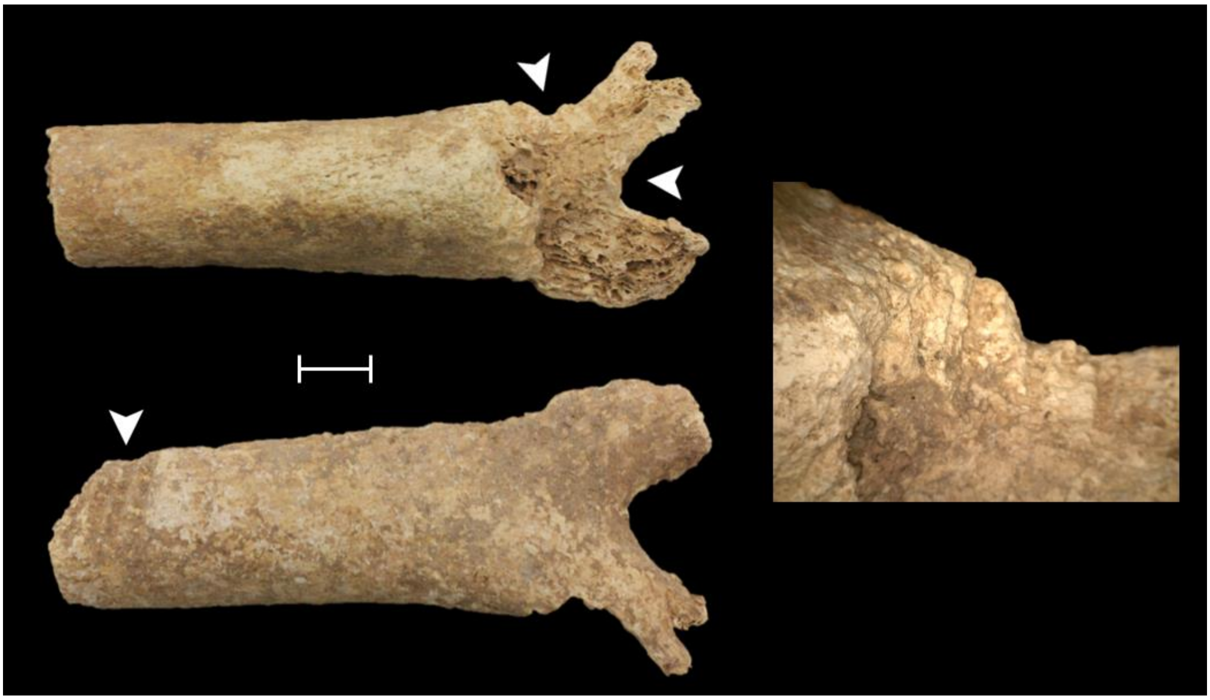


Figure 6.20: Linear marks on distal humerus (fragment 227). Top: linear abrasion on distal epiphysis and fragmentation of the olecranon fossa; inset: rounded, u-shaped profile and worn margins visible under DinoLite; Bottom: linear marks on posterior aspect adjacent to fragmentation margin. Scale: 1 cm, photos by author.

6.3.5 Discolouration and burning

The frequency of weathering and abrasion do not fully account for the low preservation of bone cortices. Discolouration due to burning and staining by multiple agents has also obscured the cortex of many fragments. Extensive discolouration was noted on 1,841 fragments (12.5%), referring mostly to red ochre, soil, limestone, plants or fungi. Most fragments were slightly stained due to ochre dispersed within the soil; as such, only heavily ochre-stained fragments were recorded, where the intensity of the ochre staining was particularly vibrant (e.g. Figure 6.21). Staining due to plants or fungi varied from green, to grey, to greyey-brown in colour, and were occurred either in dendritic patterns, or in rounded ‘bloom’ patches (Dupras and Schultz 2014, 332).

Figure 6.21: Fragment 11103, femoral fragment, with pink to red ochre staining. Scale: 1 cm, photo by author.

Limestone staining was occasionally accompanied by limestone concretions, and these remains accord with Evans’ (1971, 113) observations of a “white limey substance” in a fill which occasionally overlay an ochred deposit. Soil staining was dark brown in colour, matching the description of the topmost clayey fill (*ibid.*). This soil, free of ochre, is likely the result of natural infill which accrued over several thousand years. Light pink ochre staining on many fragments, often resulting in a powdery texture adhering to the cortical surface, indicated that the sediment was suffused with ochre. Ochre has antibacterial and antifungal properties and is effective for tanning hides as it prevents the breakdown of collagen (Rifkin 2011). The use of ochre on skeletal remains suggests that it had other, perhaps more symbolic, uses within funerary rites. Nevertheless, if used in great quantities, ochre may have altered the pH of the depositional environment and perhaps inhibited the growth of fungi.

Burning was noted on 36 fragments, including 15 cranial fragments, 13 long bones, two teeth, three vertebrae, one scapula and one rib. Patches of light to dark brown colour were observed, occasionally alongside cortical flaking and splitting. This is attributed to charring or scorching, with only parts of bone fragments exposed to a heat source or flame, as full cremation would result in more even discolouration of bone across a greater surface area. The patchy nature of the charring indicates remains were not intentionally burnt. Instead, it is possible that open flames were occasionally present within the tombs and may have scorched nearby bones. As the tombs are small and dark, torches would likely have been necessary to use during the interment of corpses or rearrangement of remains.

6.3.6 Animal damage

A small percentage of human remains exhibited animal damage attributed to rodents and insects. Rodent gnaw marks were recorded on 14 long bone fragments (0.9%) which exhibited patches of repeated paired gnaw marks. Modifications due to insects were noted on 45 fragments of crania and long bones (0.3%), in the form of rounded pits, bores, and furrows.

6.3.6.1 Rodent gnawing

Rodent gnaw marks were observed on 14 fragments (Table 6.6). These occurred as sets of parallel linear grooves, typically short and narrow with flat bases, consistent with rodent upper incisors (Figure 6.22). Some were slightly eroded and have only provisionally been identified as rodent gnawing (fragments 423, 435, 690). Nearly all gnaw marks were observed on crests or ridges of long bone, which are preferentially chewed by rodents (Figure 6.23). The internal aspect of the gnaw marks was often consistent with the cortical surface of unmodified portions of the fragment, and some cross-sections were observed to be stained and discoloured. This indicates that rodent gnawing occurred in antiquity. The limited number of observations may be attributed to the poor preservation of most remains, which has often obfuscated observation of the complete cortical surface. While it is possible that some remains were exposed prior to deposition, there is no secure evidence that the tomb entrances were blocked, and rodents and scavengers were likely able to access the tomb contents on occasion.

Frag ID	Element	Side	API	QBI	Length (mm)	Description
358	Humerus	Left	1	3	82	Several sets of transverse short and narrow grooves on diaphysis.
388	Humerus	Right	1	2	123	Multiple short and narrow grooves on lateral supracondylar margin.
413	Humerus	Left	2	3	139	Multiple short and narrow grooves on anterior diaphysis.
423	Tibia	Left	1	2	112	Several transverse grooves on diaphysis.
435	Humerus	-	1	1	86	Multiple linear grooves and several pits. Possible rodent gnawing.
690	Humerus	Right	1	2	54	Four parallel striations. Likely rodent gnawing.
5564	Femur	-	1	2	131	Two sets of a several grooves near fragmentation margin.
6227	Tibia	Right	1	1	112	Multiple sets of short linear grooves, transverse across crest.
6583	Femur	-	1	1	86	Multiple short linear grooves, transverse across diaphysis.
6970	Humerus	Right	1	0	76	Series of short linear grooves across diaphysis.
10639	Humerus	-	1	0	105	Numerous linear grooves transverse across diaphysis.
11208	Clavicle	Left	3	3	86	Four narrow and short linear grooves.
11671	Clavicle	Left	1	4	75	Series of multiple short and narrow grooves.
12220	Femur	-	1	3	100	Multiple linear grooves on the endosteal surface adjacent to fragmentation margin.

Table 6.6: All fragments displaying rodent gnawing.

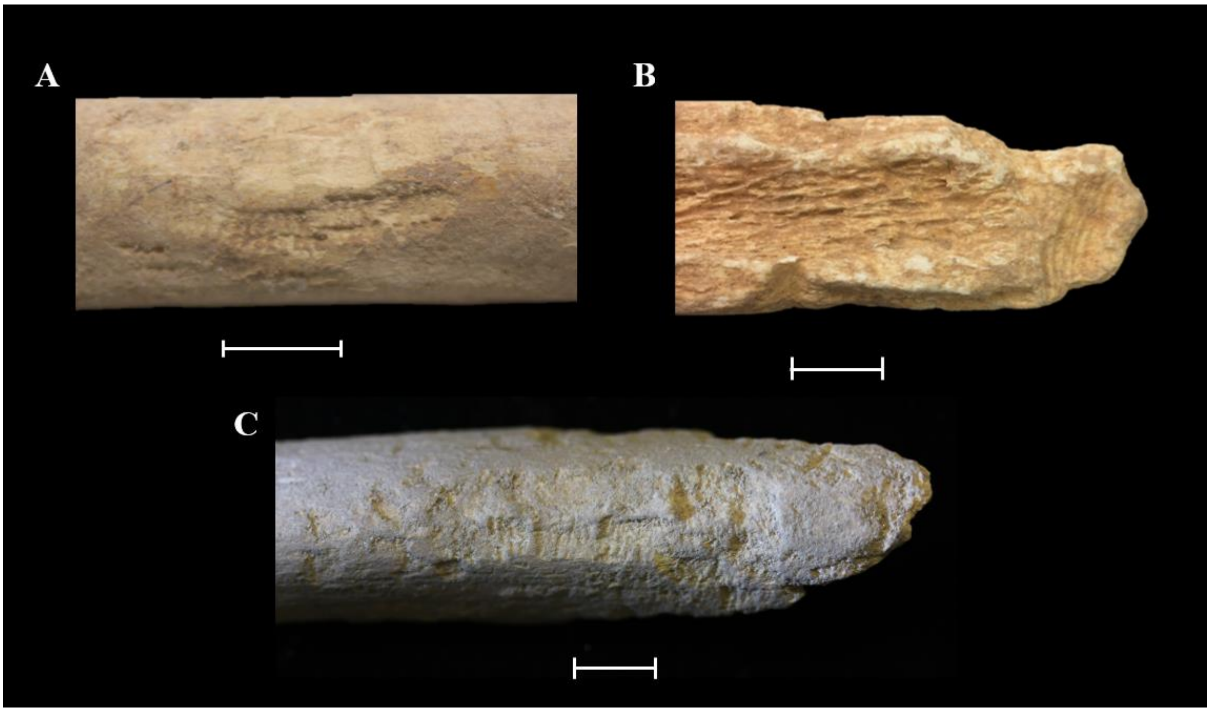


Figure 6.22: Rodent gnawing. A: fragment 413, humerus; B: fragment 12220, femur; C: fragment 6227, tibia. Scale: 1 cm, photos by author.

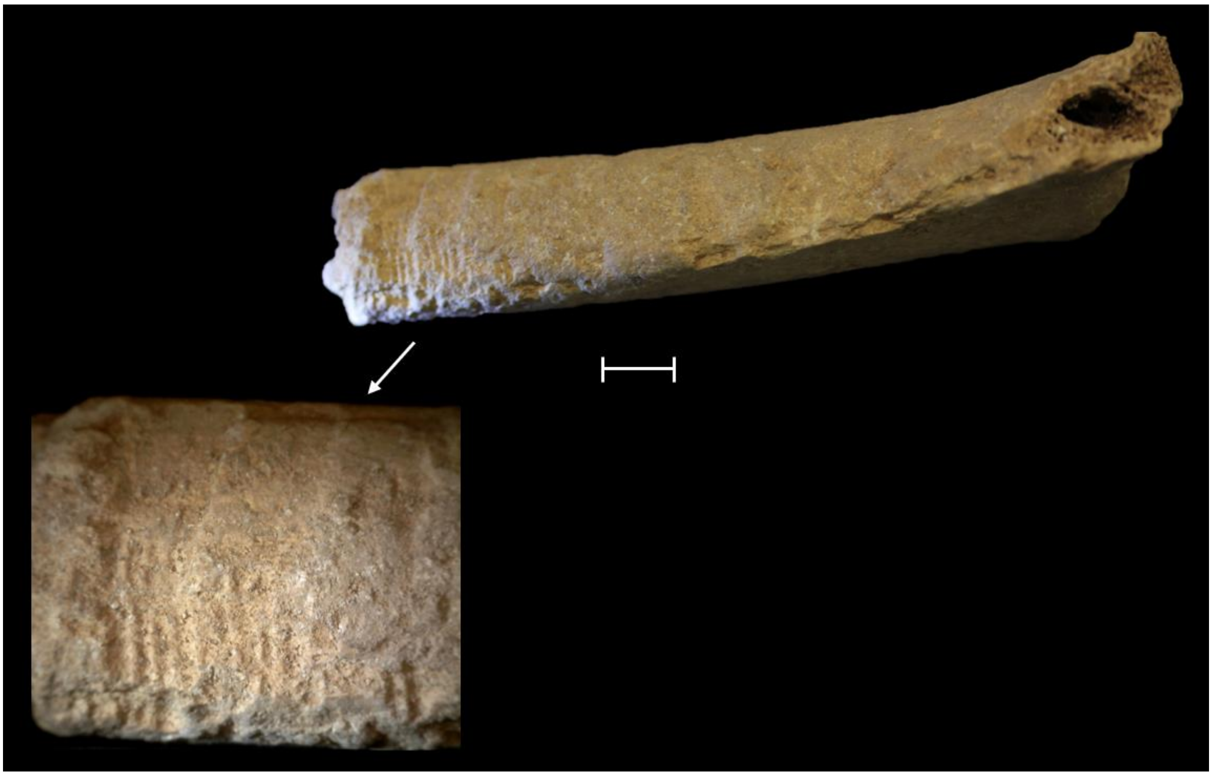


Figure 6.23: Right humerus (fragment 388) with rodent gnawing on lateral border. Inset: gnawing viewed under DinoLite. Scale: 1 cm, photos by author.

6.3.6.2 Insect damage

Circular or ovate pits and bores with clearly defined margins were attributed to insect damage. They are present on cranial (n=5) and long bones (n=40) ranging from 30–121 mm in length, all of which represent <50% of the skeletal element (Table 6.7; Figure 6.24). Only one fragment retains >50% of the original cortical surface; erosion, abrasion and weathering have obscured most of the cortical surface on many fragments. The number of modifications observed on each fragment ranged from 1 to ≃30 bores, and on each fragment the diameter of the modifications was similar (typically 1–4 mm in diameter; Figure 6.25). Overall, the bores ranged from 0.6–4mm in diameter. The curated material, including bags of pulverised chips of bone, was carefully searched for any remains of the insects (as chitinous exoskeletons, or exuviae, can preserve well), but none was found.

Frag ID	Element	API	QBI	Length (mm)	Total	Description
477	Femur	1	1	100	1	Extensive insect damage, pits and furrows ⌀: c.1mm
479	Femur	1	1	76	1	Insect damage
483	Femur	1	1	91	1	Localised insect damage, ⌀: c.1mm
486	Radius	1	2	103	1	Minimal insect damage
492	Ulna	2	1	105	1	Minimal insect damage
512	Humerus	1	1	69	1	Minimal insect damage, 2 bores
518	Humerus	2	3	76	1	Insect damage, ⌀: c.1–2mm
528	Femur	1	1	70	1	Minimal insect damage
530	Femur	1	1	48	1	Minimal insect damage
536	Long bone	1	2	51–60	7	Minimal insect damage
615	Occipital	1	1	41	1	Minimal insect damage
688	Femur	1	1	80	1	Insect damage
5273	Parietal	1	1	49	1	1 large bore ⌀: c.3mm, and further bores on fragmentation margin
5368	Long bone	1	3	91–100	1	Multiple bores on internal aspect and few external, ⌀: c.1–3mm
5369	Femur	1	1	71	1	Multiple bores ⌀: c.1-2mm
5550	Humerus	1	0	60	1	1 bore ⌀: c.1–2mm penetrating cortex
5567	Femur	1	0	66	1	Multiple bores ⌀: c.1–3mm
6197	Femur	1	0	128	1	1 bore ⌀: c.1–2mm
6323	Femur	1	0	41	1	Multiple bores ⌀: c.1mm

Table 6.7: All fragments exhibiting insect damage, ⌀=diameter.

6626	Parietal	1	1	63	1	Multiple bores on ectocranial and endocranial surfaces, and fragmentation margin, ⌀: c.1–3mm
6822	Femur	1	0	77	1	1 bore ⌀: c.1mm
6833	Tibia	1	0	53	1	1 bore ⌀: c.4mm
6834	Long bone	1	0	71–80	1	Multiple bores ⌀: c.1–5mm
7938	Femur	1	0	83	1	1 bore ⌀: c.3mm
7974	Long bone	1	0	51–60	1	1 bore, internal ⌀: c.4mm, external ⌀: c.1mm, fully penetrated cortex
8695	Femur	1	0	94	1	2 bores, ⌀: c.3mm
8701	Femur	1	0	121	1	3 bores, ⌀: 1–3mm
8720	Femur	1	0	114	1	Extensive damage, multiple bores ⌀: c.2-6mm
8892	Long bone	1	1	51–60	1	Multiple bores ⌀: c.1mm
8893	Long bone	1	0	61–70	1	1 bore, ⌀: c.3mm
8894	Long bone	1	0	91–100	1	Multiple bores, ⌀: c.1–4mm
8895	Long bone	1	0	112	1	Multiple bores on internal and external aspects and fragmentation margin, ⌀: 3–5mm
10048	Long bone	1	0	61–70	1	Multiple bores, ⌀: 1–3mm
10051	Humerus	1	0	103	1	Multiple bores, including one penetrating cortex, ⌀: 1-4mm
10320	Long bone	1	0	81–90	1	1 bore, ⌀: c.4mm
11074	Cranial frag	1	3	41–50	1	Multiple bores on endocranial surface, ⌀: c.1mm
11081	Cranial frag	1	0	31–40	1	Bores on endocranial and ectocranial surfaces, ⌀: c.1–2mm
11262	Humerus	1	0	89	1	1 bore, ⌀: c.4mm and 11mm deep
12207	Long bone	1	2	41–50	1	1 bore, ⌀: c.4mm

Table 6.7 (continued): All fragments exhibiting insect damage, ⌀=diameter.

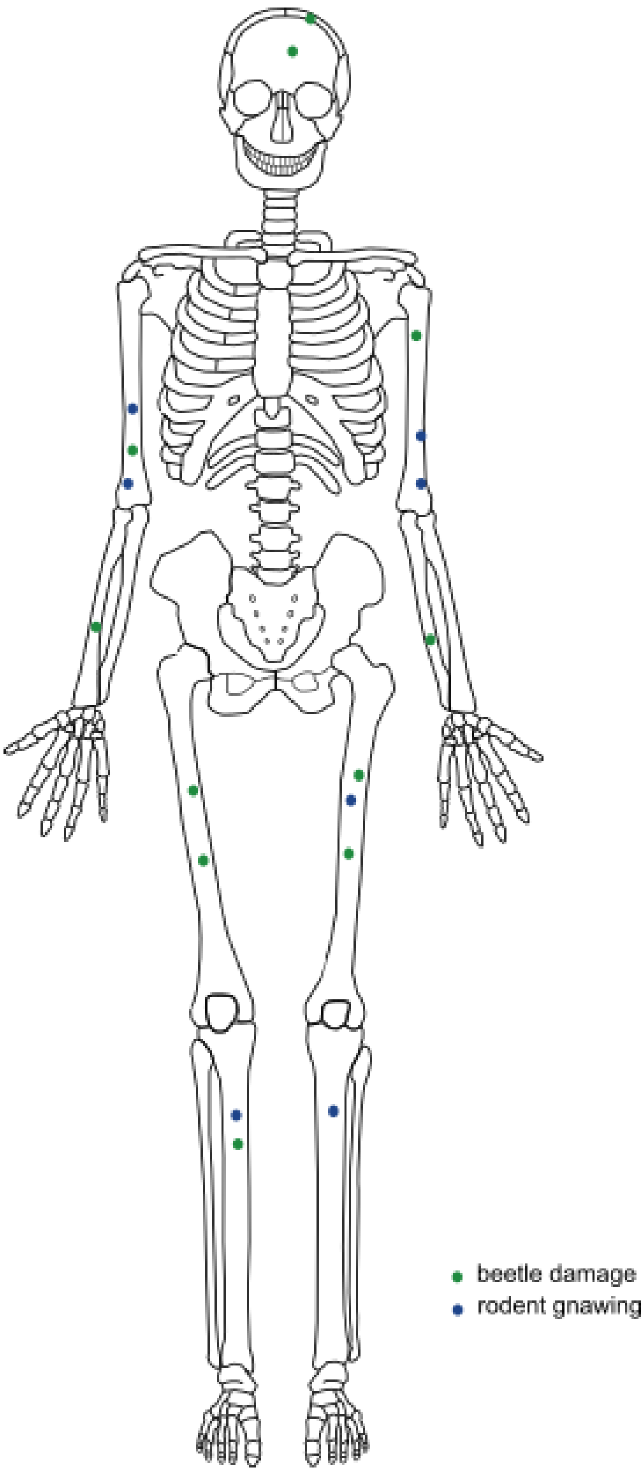


Figure 6.24: Schematised location of beetle damage and rodent gnawing across the skeleton.

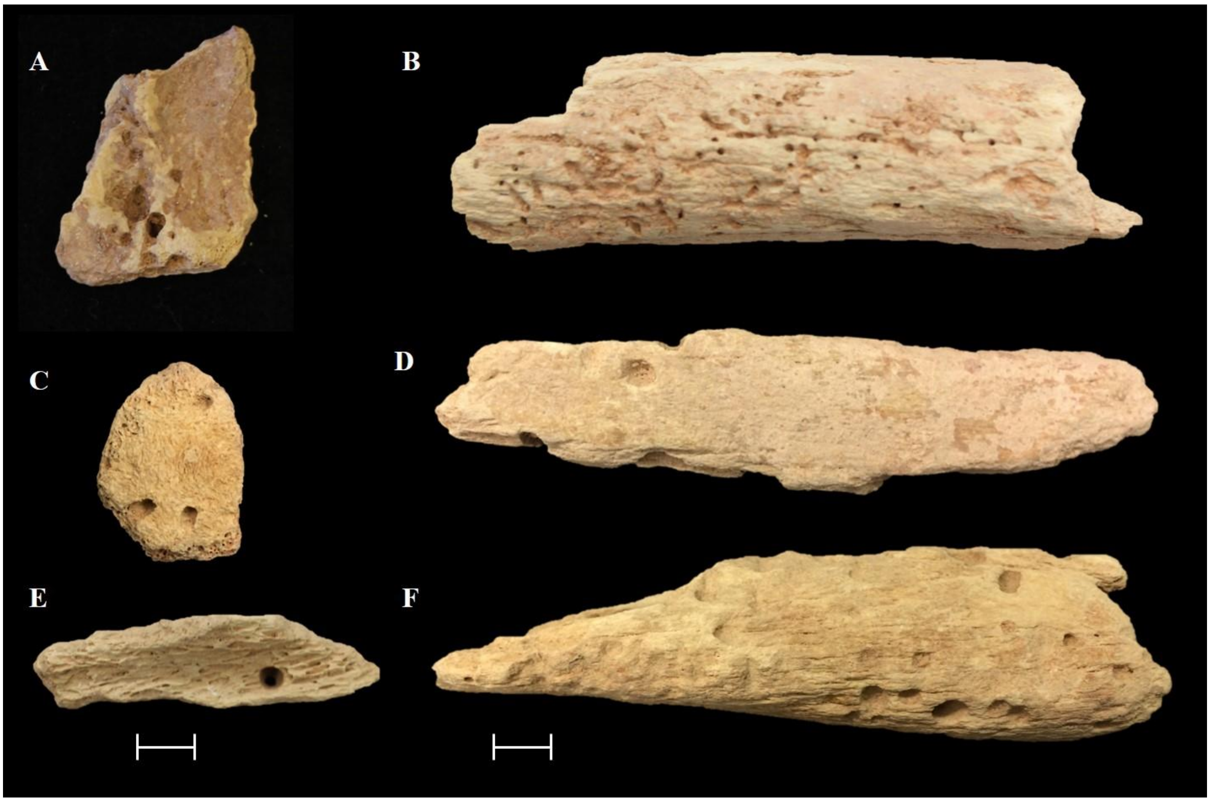


Figure 6.25: Insect modifications, scale: 1 cm. A: fragment 6626, parietal; B: fragment 477, femur; C: fragment 11081, unidentified cranial bone; D: fragment 8895, unidentified long bone; E: fragment 7974, unidentified long bone; F: fragment 8720, femur. Photos by author.

Due to time constraints, it was not possible to fully record all insect damage. Fifteen fragments displaying bores were retained for further analysis, including micro-CT scanning and 3D reconstruction, with the permission of the Superintendence of Cultural Heritage, Malta (Thompson *et al.* 2018). These fragments were selected as they represented the full sample displaying insect borings: they derived from crania, upper and lower limb bones, and most exhibited more than one well-defined bore. The modifications were recorded following Britt *et al.* (2008) and categorised as pits, bores or furrows based on their morphology. Britt *et al.* (2008) also recorded grooves (paired shallow scratches created by insect mandibles), however, due to the prevalence of cortical erosion on the majority of osseous remains, grooves were not included. Pits are defined as hemispherical excavations with irregular margins (Figure 6.26a) and are distinguished from shallow pits which are less than 0.5mm in depth. Shallow pits may also be referred to as incipient pits, and have been linked to feeding on bone (Zanetti *et al.* 2014). Bores are defined by their parallel sides; they represent internal mining of the bone to excavate pupation chambers and are divided into shallow (<5 mm) and deep (>5 mm) categories (Figure 6.26b and c). Furrows are the result of external mining and resemble meandering channels in the bone cortex (Figure 6.26d).

On the fifteen fragments retained for analysis, bores were the most commonly observed modification, and most were present on the external surface of the bone (Table 6.8). Furrows were observed on only two fragments, and their preservation may have been affected by the poor preservation of bone cortices. Modifications to both external and internal surfaces on some fragments, alongside excavations on the fragmentation margins, indicates that in some cases, insects had access to already fragmented and skeletonised bone.

Frag ID	**Element**	**Pit**	**Bore**	**Furrow**
477	Femur	-	X (E)	X (E)
5273	Parietal	-	X (E)	-
5368	Long bone	X (I)	X (I & E)	-
5369	Femur	X (E)	X (E)	-
5567	Femur	X (E)	X (E)	-
6626	Cranial fragment	X (I & E)	X (I & E)	-
8701	Femur (L)	X (E)	-	-
8720	Femur	X (E)	X (E)	-
8892	Long bone	X (E)	X (I & E)	-
8893	Long bone	-	X (E)	-
8895	Long bone	X (I & E)	X (E)	-
10048	Long bone	X (E)	X (E)	X (E)
10051	Humerus (R)	X (E)	X (E)	-
11074	Cranial fragment	-	X (I)	-
11081	Cranial fragment	-	X (E)	-

Table 6.8: Modifications observed as a result of beetle activity classified by morphology on the 15 fragments retained for further analysis (X = present; -= absent; E=external/ectocranial; I= internal/endocranial). (adapted from Thompson *et al.* 2018, 127).

Measurements were taken of the maximum diameters of pits and bores across three fragments, using a Leica® M165 stereo microscope and Leica Application Suite EZ software (Thompson *et al.* 2018, 126; Table 6.9). The mean diameter of the modifications is just below that recorded for dermestid pupal chambers on human bone from both modern and archaeological samples, which ranged from 3.04–3.98 mm (Huchet *et al.* 2013, 3796). However, they are within the size range of the dermestid bores observed both human bone (*ibid.*) and on Pleistocene and Miocene bison (Martin and West 1995). Evidence of dermestid modification to archaeological human bone is limited, although the recent re-analysis of human skeletal material from the Jericho and Munhata tombs (Huchet *et al.* 2013) has revealed similar circular borings as those observed on the Xemxija tomb remains. The slightly smaller size of bores on the Xemxija remains may be explained through dermestid feeding patterns, as incipient pits may be the result of feeding on bone (see Zanetti *et al.* 2014, 999). Small pits may represent partial casts of pupation chambers which were originally excavated in dried tissue, resulting in only the base of bore preserved in bone (see Huchet *et al.* 2013, 3800).

The size and morphology of pits and bores is therefore consistent with those demonstrated to be the result of dermestid feeding and pupation. Research has shown that 19 species of dermestids are currently present on the Maltese islands, including three of the most common outdoor species in the Mediterranean: *Dermestes maculatus* De Geer, *Dermestes frischii* Kugelan and *Dermestes undulatus* Brahm (Háva 2003; Háva and Mifsud 2006; Martín-Vega and Baz 2012). These species are among the limited number which have been observed directly on human remains (Charabidze *et al.* 2014).

These results are significant for understanding both the tomb environment and funerary practices. Dermestid larvae survive best in warm, dry environments, and actively avoid excessive light and humidity (Charabidze *et al.* 2014). The temperature and condition within the tombs would likely only have been amenable for habitation during the hottest part of summer, limiting the periods during which they were able to modify remains. Dermestids exclusively colonise exposed remains and have never been observed within the internal aspects of bones. Yet, as some fragments exhibit internal modifications, it is evident that dermestid beetles were in the proximity of already-fragmented bones and further, that corpses were not initially covered with soil. Since they preferentially feed on dried tissue and bore pupation chambers into softer materials, their modification of bone could indicate a period of stress whereby food and alternative pupation substrates were unavailable (Roberts *et al.* 2003). Dermestids would not have been an endemic species within the tombs. As such, they must have been transported during the funerary process, perhaps in organic materials such as hide, which could have been used to wrap corpses (Fontenot *et al.* 2015; Thompson *et al.* 2018). Therefore, under optimal temperature conditions, dermestids survived within the tombs and exploited decomposing and skeletonised remains (Thompson *et al.* 2018).

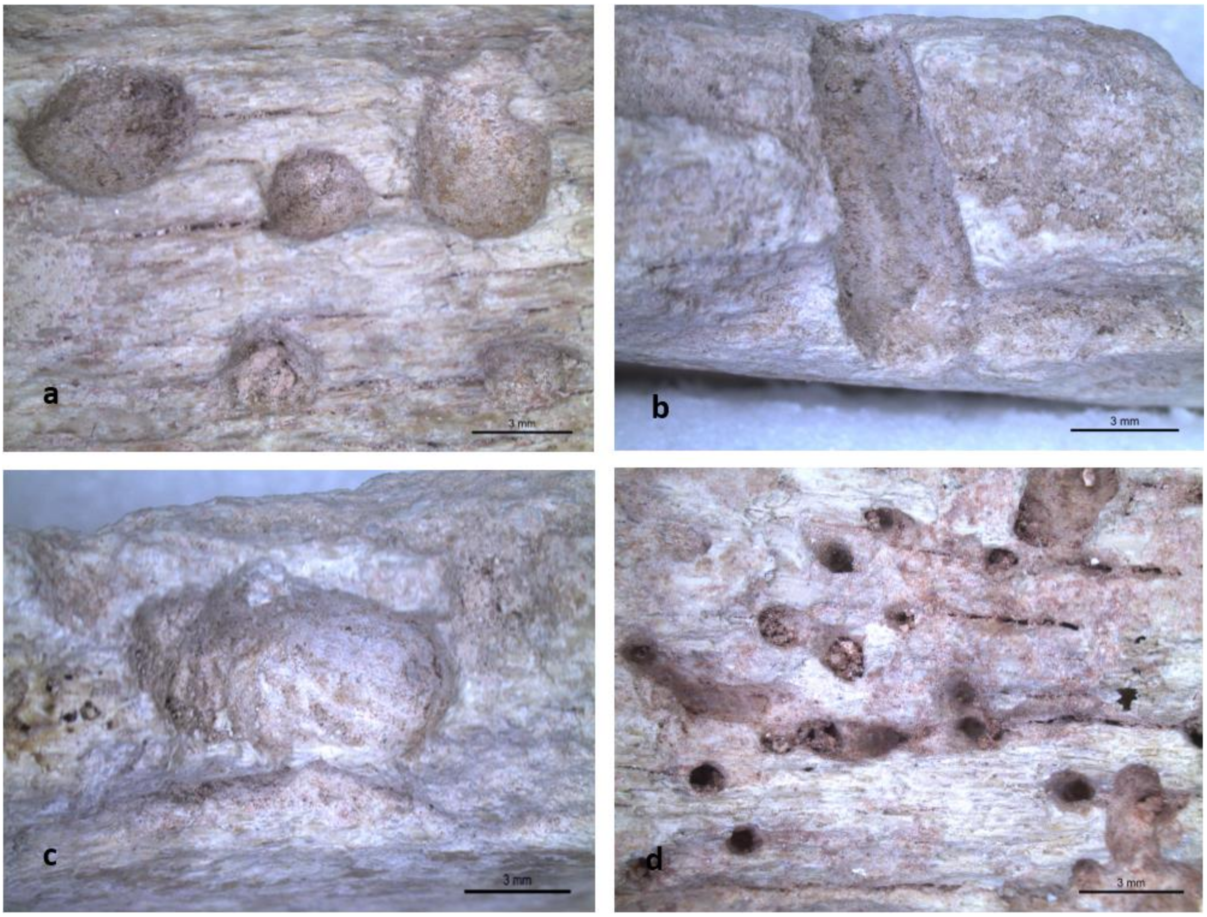


Figure 6.26: Types of beetle modifications observed on Xemxija human remains; a: circular hemispherical pits, fragment 8720; b: deep bore truncated by fragmentation, fragment 8895; c: deep bore excavated into fragmentation margin, fragment 8895; d: furrows between incipient bores, fragment 477 (photos by author, see Thompson *et al.* 2018, 127).

Frag ID	Diameter 1 (mm)	Diameter 2 (mm)	Depth (mm)	Type
477	0.627	0.842		Pit
477	0.667	0.822		Pit
477	1.135	1.139		Pit
8720	2.567	2.269		Pit
8720	2.889	2.928		Pit
8720	2.572	2.885		Pit
8720	3.972	3.655		Pit
8895	3.314	3.771	9.445	Bore
8895	3.07	4.086	9.128	Bore
8895	3.899	-		Pit
Mean	2.471	2.488		

Table 6.9: Measurements across maximum diameter of pits, and diameter and depth of bores, from three fragments (adapted from Thompson *et al.* 2018, 127).

6.4 Skeletal element representation

SER was calculated for the entire assemblage, as well as for adult (Table 6.10) and nonadult individuals (Table 6.11) to investigate funerary treatment according to age (Appendix 2.6).

Element	MNE Left	MNE Axial/Unsided	MNE Right	BRI adult	MNI adult
Cranium	-	16	-	20.00	16
Mandible	6	8	12	32.50	26
Clavicle	26	-	27	33.13	26
Hyoid	-	1	-	1.25	1
Cervicals	-	79	-	14.11	24
Thoracics	-	105	-	10.94	9
Lumbars	-	23	-	5.75	5
Ribs	132		172	15.83	14
Scapula	12	4	12	17.50	12
Manubrium	-	1	-	1.25	1
Sternum	-	8	-	10.00	7
Humerus	30	-	24	33.75	30
Radius	21	5	31	35.63	31
Ulna	23	13	35	44.38	35
Carpals	29	6	34	6.16	11
Metacarpals	241	93	236	71.25	60
Manual phalanges	-	741	-	33.08	27
Pelvis	5		3	5.00	5
Sacrum	-	5	-	6.25	3
Coccyx	-	4	-	5.00	4
Femur	13	8	12	20.63	12
Patella	23	-	31	33.75	31
Tibia	9	13	7	18.13	9
Fibula	17	1	21	24.38	22
Talus	42	-	39	50.63	43
Calcaneus	5	-	9	8.75	9
Tarsals	44	-	37	10.13	45
Metatarsals	315	87	328	91.25	80
Pedal phalanges	-	425	-	18.97	61

Table 6.10: MNE, MNI and BRI calculations for all adult skeletal elements from the Xemxija Tombs.

Element	MNE Left	MNE Axial/Unsided	MNE Right	BRI nonadult	MNI nonadult
Cranium	-	9	-	28.13	9
Mandible	7	1	2	31.25	5
Clavicle	12	-	9	32.81	12
Hyoid	-	2	-	6.25	2
Cervicals	-	19	-	8.48	7
Thoracics	-	15	-	3.91	3
Lumbars	-	9	-	5.63	2
Ribs	20	2	16	4.95	3
Scapula	8	-	4	18.75	8
Manubrium	-	1	-	3.13	1
Sternum	-	2	-	6.25	2
Humerus	9	-	10	29.69	10
Radius	6	-	7	20.31	7
Ulna	9	-	5	21.88	9
Carpals	1	-	-	0.22	1
Metacarpals	8	8	6	6.88	3
Manual phalanges	-	23	-	2.57	2
Pelvis	5	-	10	23.44	10
Sacrum	-	3	-	9.38	3
Coccyx	-	0	-	0.00	-
Femur	20	7	16	67.19	20
Patella	3	1	1	7.81	3
Tibia	11	-	9	31.25	11
Fibula	-	2	1	4.69	1
Talus	2	-	0	3.13	1
Calcaneus	2	-	.3	7.81	3
Tarsals	1	-	0	0.31	1
Metatarsals	23	28	13	20.00	11
Pedal phalanges	-	19	-	2.12	18

Table 6.11: MNE, MNI and BRI calculations for all nonadult skeletal elements from the Xemxija Tombs.

Almost all skeletal elements are present, but their relative representation is extremely uneven (Figure 6.27). As expected, given the FI results above (§6.2.1), crania (BRI=22%) and long bones (18–38%) are significantly under-represented. The relative lack of crania compared to mandibles is most likely due to their high fragmentation. Small bones, and elements with a high proportion of trabecular bone, are under-represented, including the hyoid (<3%), carpals and coccyges (<4%), and the *corpus sterni*, thoracic vertebrae, lumbar vertebrae, sacra, calcanei (<10%). The under-representation of these elements is attested even in cemeteries (Bello 2005; Bello and Andrews 2006). The presence of small bones suggests a fair level of excavation recovery, but their numbers are so low as to indicate the combined effects of *in situ* degradation and the cultural practice of successive deposition.

The upper limbs are slightly more well-represented than the lower limbs, although the reverse is true for the extremities. Carpals, metacarpals and manual phalanges are, overall, less well-represented than tarsals, metatarsals and pedal phalanges, perhaps as they are smaller in size. Metatarsals are the most highly represented element (70%) and the right third metatarsal provided the adult MNI. These results accord with the finding that elements of the extremities are some of the most complete bones in the assemblage (see §6.3.1). This is a very unusual pattern, as the extremities are typically under-represented in highly disturbed contexts reflecting secondary deposition (Robb 2016, 690). Their relative over-representation produces a typical residual profile, demonstrating that complete individuals were deposited within the tombs and major bones later removed. The resulting uneven representation of other skeletal elements is due to both intrinsic and extrinsic factors, and in large part may be attributed to successive deposition. If fragmentation could be controlled for, for example through refitting long bones, it is likely that their relative representation would increase.

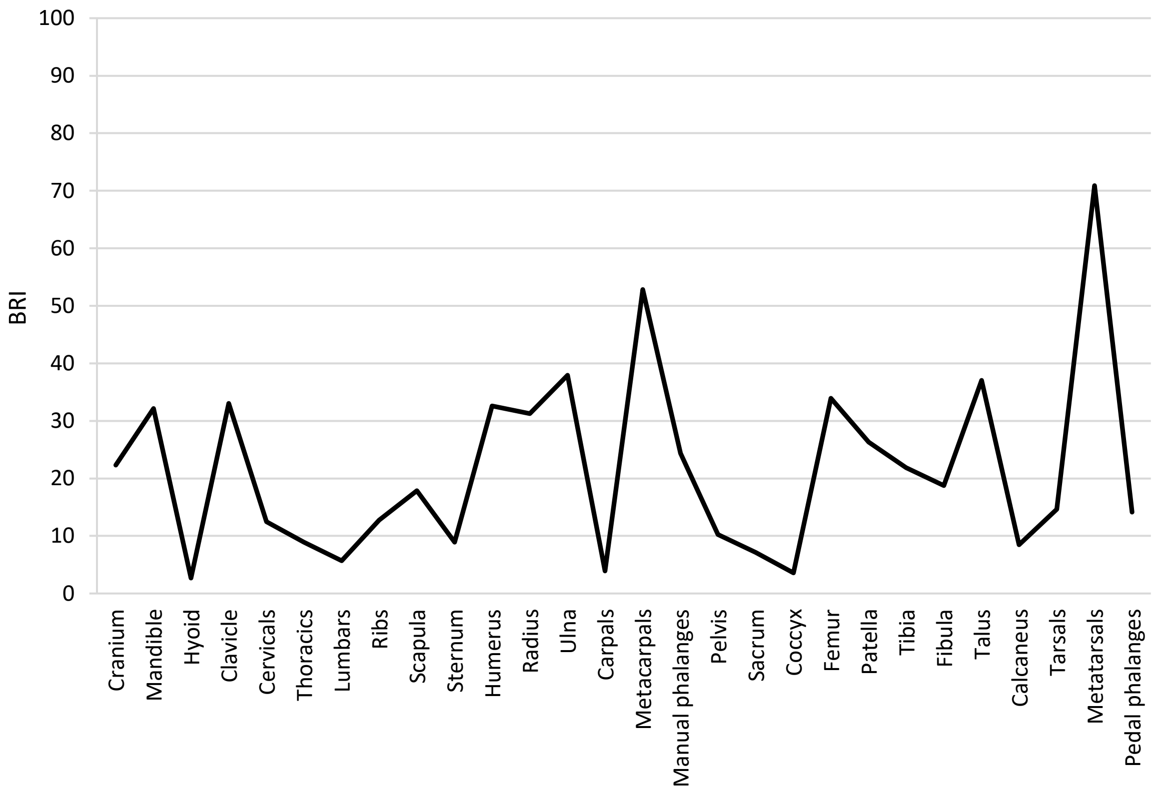


Figure 6.27: Skeletal element representation in the Xemxija Tombs.

There are some differences between the representation of adults and nonadults (Figure 6.28). The most well-represented nonadult element is the femur (67%), followed by the tibia (31%). This contrasts the over-representation of metacarpals and metatarsals among the adult remains, although a small peak in the representation of nonadult metatarsals (20%) stands out from the relative lack of other pedal elements. Elements of the skull and upper body are similarly represented for both adults and nonadults. From the pelvic girdle below, representation clearly differs. Nonadult *ossa coxae* (23%) are better preserved than adult *ossa coxae* (5%), perhaps because pelvic girdle morphology is more amenable to preservation prior to full fusion. The femur and tibia are likewise better preserved among nonadults, although adult patellae and fibulae have survived better.

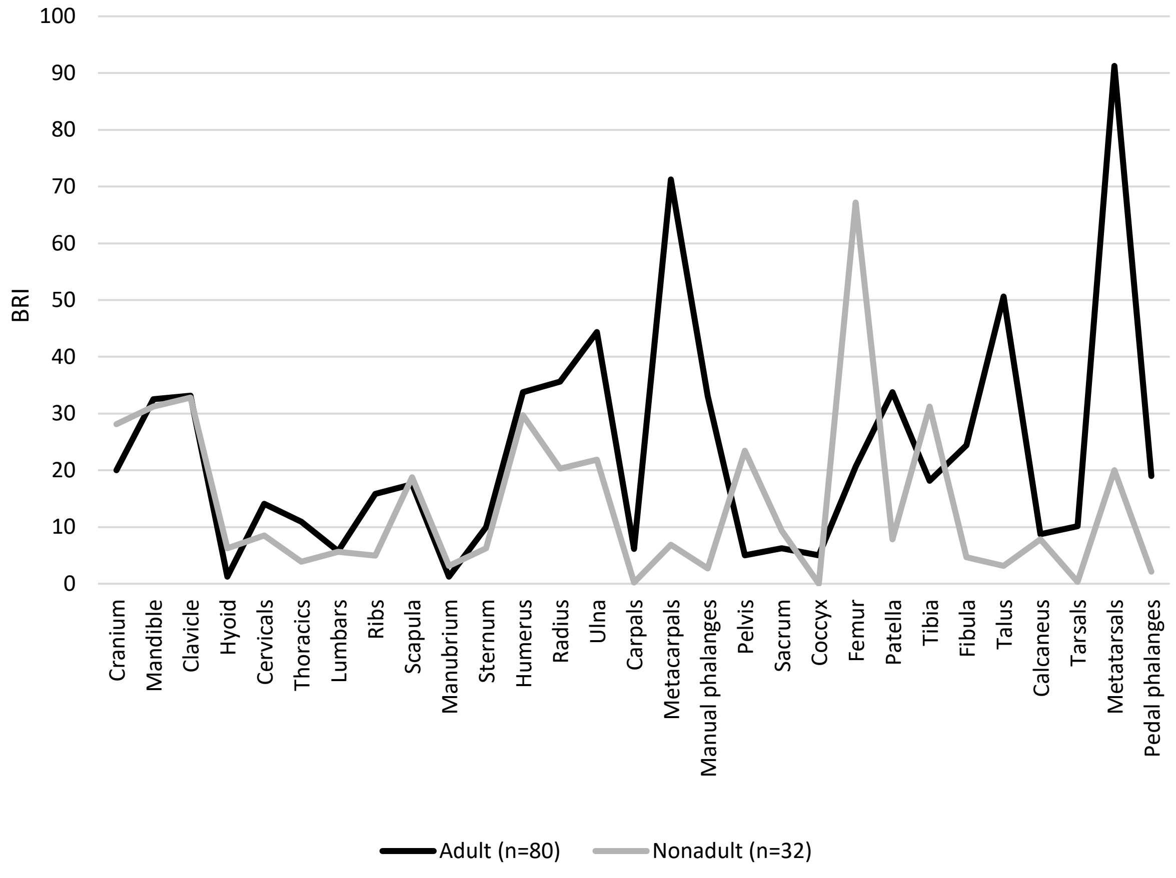


Figure 6.28: Skeletal element representation for adult and nonadult remains.

The contrast between adult and nonadult element representation is notable, although the results must be interpreted with caution, as natural taphonomic processes and extensive secondary disturbance can result in similar profiles (Beckett and Robb 2006, 69; Robb 2016). The low representation of fragile elements, discussed above, and lower percentage of long bone epiphyses compared to diaphyses (among both adults and nonadults), indicates that bone attrition is related to density and has been further compounded by excavation bias. This may partly explain differential preservation among the nonadult remains. To this end, it is difficult to hypothesise how a residual pattern may be observed among nonadult remains in assemblages with these limitations. A residual profile relies on the visibility of small and fragile bones which, depending upon age, may be unfused and difficult to identify during excavation. The average representation of all bones for adult individuals is 23%, higher than the nonadult average of 14%, suggesting that nonadult remains were more adversely affected by natural degradation.

Nonadult remains have also been affected by weathering, likely due to periodic inundation (6%) and abrasion (9%), and one nonadult humerus (Frag ID 518) exhibited beetle damage. Long bone fragmentation among nonadults is slightly lower, with 39% of long bones representing >50% of the element. As they have been less frequently fragmented, nonadult long bone counts are likely more representative than adult long bone counts.

The representation of all skeletal elements indicates that the dominant mode of deposition was primary deposition of corpses. Repeated secondary depositions would be expected to result in the under-representation of elements comprising labile joints. At Xemxija, the high number of metacarpals and metatarsals does not support this expectation. While it is evident that crania and long bones have been highly fragmented, the overall trend is a residual profile (see §5.7.2), illustrating primary depositions from which certain bones were removed. This reflects multiple successive inhumation, with regular disturbance, redistribution and selective bone removals. It is highly probable that (if they could be calculated) element representation curves for each tomb would show distinct patterns, perhaps with slightly different funerary practices as well as varied numbers of individuals within each tomb. At present knowledge, given the MNI of 112, least 18 individuals may have been interred in each tomb. Their successive deposition resulted in high fragmentation and disintegration, especially of fragile elements, while small bones of the extremities may have fallen to the base of each chamber, preserving them in high numbers.

Compared to several other sites, Xemxija is notable for its very low representation of most skeletal elements (Figure 6.29). The Roman cemetery of West Tenter Street displays more even element representation, with most elements between 40–60% (Waldron 1987). In contrast, secondary deposition predominated at Kunji Cave (Emberling *et al.* 2002), Nanjemoy Creek ossuary (Ubelaker 1974) and Scaloria Cave (Robb *et al.* 2015). At Kunji Cave, crania are over-represented due to their preferential curation, small bones of the extremities are under-represented at Nanjemoy creek, and at Scaloria Cave the redeposition of both complete and partial bodies is indicated. Xemxija follows the general pattern of these sites, with an under-representation of elements of the axial skeleton, low numbers of sterna and carpals, and uneven numbers of long bones. However, the representation of the pelvic girdle is suppressed at Xemxija, due to the high degradation of trabecular bone, and the high total of metacarpals and metatarsals presents an inverse pattern to all comparative sites. This supports the assertion that funerary practices at the Xemxija Tombs were characterised by inhumations which were frequently rearranged and manipulated.

Multiple factors are responsible for the uneven SER profile at Xemxija. The over-representation of metacarpals and metatarsals reflects primary deposition. Subsequent disturbance, including removals of specific bones, is likely responsible for the under-representation of crania and long bones. Fragmentation due to successive deposition probably adversely affected smaller elements, and those with a high proportion of trabecular bone. Differential SER between adults and nonadults is due to a complex combination of natural and cultural processes. It is possible that selective bone removals mostly targeted adult remains; however, disentangling this from the effects of fragmentation is difficult. Overall, it appears that the treatment of adult and nonadult individuals was largely similar.

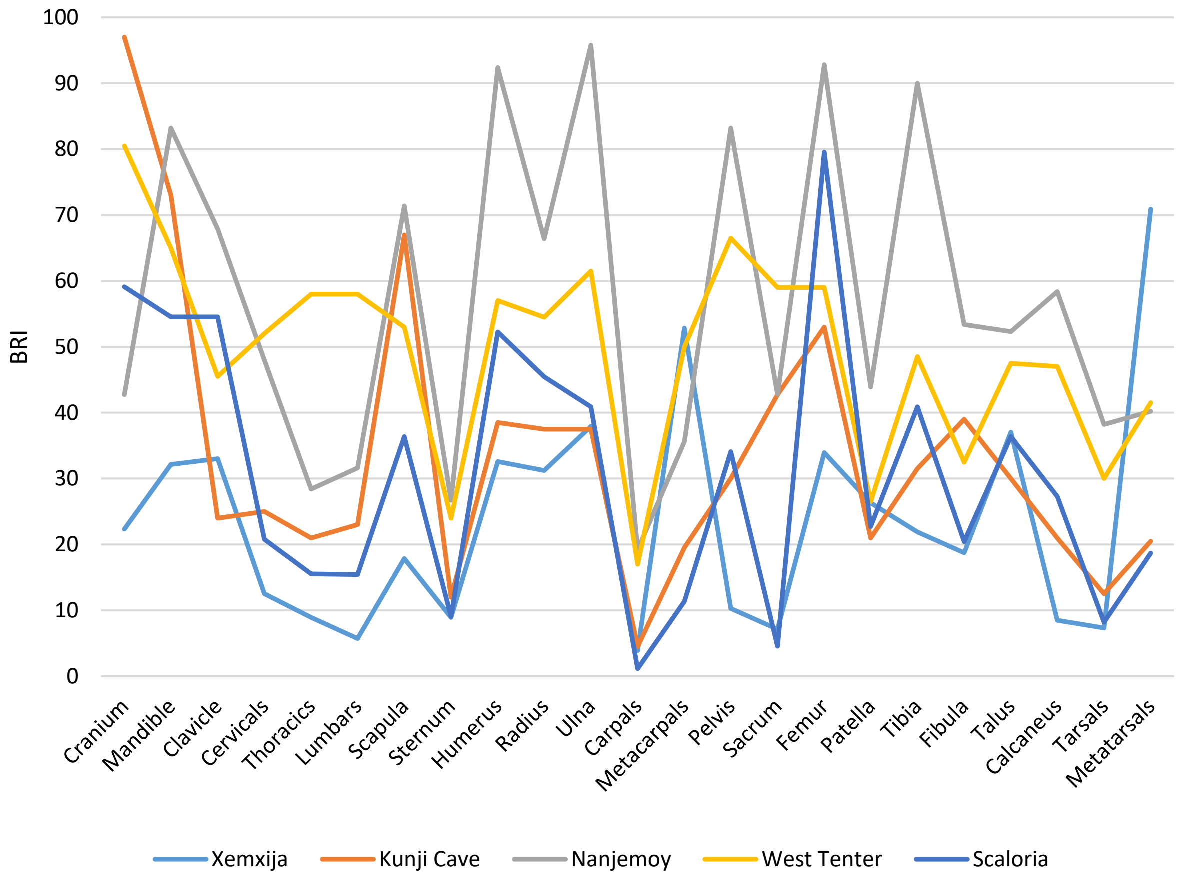


Figure 6.29: Skeletal element representation in the Xemxija tombs and comparative sites.

6.5 Funerary practices at the Xemxija Tombs

At least 112 individuals—80 adults and 32 nonadults from foetal age and above—were deposited within Xemxija Tombs 1–6. The assemblage is largely poorly preserved (Table 6.12). Most bones represent less than half the original element, and many are in poor condition and friable. High fragmentation has resulted in the under-representation of many elements. Surface modifications are mostly attributed to weathering and abrasion or erosion (which are rarely observed together), due to tumbling and root damage. Fragmentation overwhelmingly occurred to dry, fully mineralised bone, and was often followed by abrasion of the fracture margins. A small number of remains exhibit charring, beetle burrowing, and rodent gnawing. The taphonomic results show that the assemblage is homogeneous. The pattern of poor bone condition, high fragmentation, cortical thinning and flaking indicates a turbulent depositional environment, including regular cultural disturbance, as well as the effects of inundation, humidity, tumbling, and rolling.

Taphonomic variable	**Total**
<5 cm in size	66.8% (n=9,856)
<1/2 complete	74.4% (n=10,963)
<1/2 surface well preserved	66.3% (n=9,788)
Abrasion/erosion	15.3% (n=2262)
Weathering	9.1% (n=1349)
Burning	0.24% (n=36)
Insect damage	0.3% (n=45)
Rodent gnawing	0.1% (n=15)
Cutmarks	0
Total analysed	14,760

Table 6.12: Summary of taphonomic results.

Of the intrinsic factors affecting preservation, differential representation correlates closely with bone mineral density. Fragile elements are especially under-represented, and long bone epiphyses are less prevalent than diaphyses. However, preservation is largely not biased according to bone size, as the extremities are well-preserved and over-represented, resulting in a residual profile of element representation. The presence of nonadults also illustrates fair preservation of small bones, although the relative lack of unfused epiphyses and ossification centres accords with density-related attrition (and may also be an artefact of excavation bias). The deposit was buried in a "compact, clayey soil, rather damp and brown in colour", overlying a layer "heavily impregnated with a white limey substance and red ochre" (Evans 1971, 113). Both the clayey soil and limestone concretion would have impeded careful excavation; indeed, excavation damage and tool marks indicate that some fragments were difficult to remove from the matrix. Such conditions would have undermined the survival of fragile elements, compounding the effects of successive deposition.

Demographically, the Xemxija Tombs are broadly congruent with Neolithic populations elsewhere. In the Levant, childhood mortality during the Neolithic has been calculated at 38.7% (Hershkovitz and Gopher 2008, 446); at late prehistoric Iberian sites, nonadults comprise between 10–58% of the MNI (Beck 2016, 49), and in Italian Neolithic populations adults and nonadults are generally represented in roughly equal numbers (Robb 2007b, 37). However, as discussed in §3.4.2, at many 4th–3rd millennium BC megalithic burial sites, individuals <5 yo are typically under-represented. It is therefore notable that individuals of foetal, perinatal and infant age were deposited in the Xemxija Tombs. Based on taphonomic modifications and SER, nonadults generally received similar funerary and post-depositional treatment to adults. This supports the present evidence from the Xagħra Circle and, moreover, suggests that careful excavation and analysis of additional contemporary burial assemblages should provide further evidence for the inclusion of young individuals.

Altogether, the results suggest several scenarios for deathways at the Xemxija Tombs (Figure 6.30). The normative deathway for most individuals, including infants and children, was primary deposition soon after death. In some cases, individuals were wrapped in hides or other organic materials (Thompson *et al.* 2018). The high number of faunal metapodials and phalanges (Pike 1971a) and the presence of five v-perforated *Spondylus* shell buttons in Tomb 5 (Evans 1971, 115) may support this. Continued interments necessitated the rearrangement of remains, and we can infer that clearance preceding interments led to further disarticulation. The process of sequential deposition increased the pressure of overlying deposits, contributing to greater fragmentation of those below.

The over-representation of small bones attests to selective removal of elements, perhaps for circulation among relatives and the wider community. Crania and long bones are highly fragmented, but their significant under-representation suggests these elements were preferentially removed. The significance of crania is attested through cranial caches in several locations at the Xagħra Circle hypogeum (Figure 6.31). It is therefore conceivable that crania were likewise grouped and stacked in the Xemxija Tombs and, in exceptional circumstances, removed. The almost equal ratio of single and multi-rooted loose teeth may support this (see §6.2.1), demonstrating that crania were subject to extensive manipulation. Since fragmentation is difficult to account for, curation is suggested to have occurred to less than 50% of these elements. Deathways for nonadults corresponded closely with those for adults, although fewer nonadult remains seem to have been removed from the tombs.

Low levels of rodent gnawing and weathering could indicate the occasional exposure of remains. Due to the apparent infrequency of this practice, we may suggest that exposure was carried out according to circumstances surrounding an individual's death or relating to their social role. However, it is also possible that the tombs remained open during use and were accessible to scavengers. This would have exposed remains near the entrance to the effects of weathering. Due to equifinality, it is difficult to state with certainty which of these scenarios is most likely.

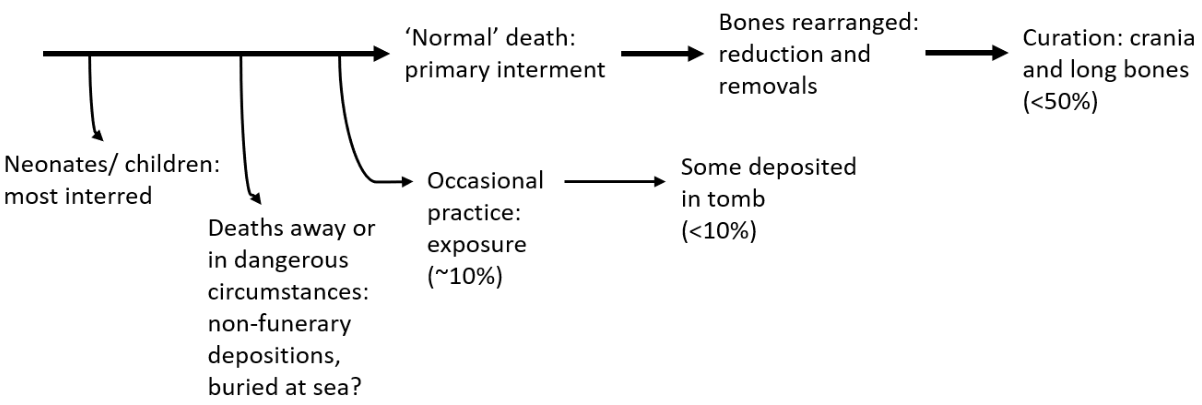


Figure 6.30: Deathways for populations around the Xemxija Tombs between 3500–2450 cal BC.

Figure 6.31: Cache of crania in context (1282) at the entrance to the northern niche in the Xagħra Circle hypogeum (photo from BRX archive).

It is well known that all cultures practice multiple forms of burial and, as discussion in §3.2.1 highlighted, differential treatment is often extended to individuals based on understandings of their personhood or according to circumstances surrounding their death. We must therefore consider that non-normative deathways were practiced which are not archaeologically visible, perhaps relating to deaths away from the community, in suspicious circumstances, or for individuals who were socially stigmatised. In these cases, non-funerary locales may have been used for exposure or deposition. Exposure without subsequent retrieval and deposition of remains would be unlikely to leave any trace. Furthermore, excavations at contemporary settlement sites have not identified human remains either within or surrounding structures. We might consider the possibility of burials at sea as an alternative practice in exceptional cases. Grima (2001) has argued for the significant cosmological role played by the sea, as a liminal space surrounding the islands. This raises the question as to whether it may have been further conceptualised as a space appropriate for the transition of death.

In the following chapter, the results from the Xagħra Circle are presented. These are then compared with the Xemxija Tombs through statistical and qualitative analysis in Chapter 8.

CHAPTER SEVEN

RESULTS II: XAGĦRA CIRCLE

7.1 Sampling methodology

Due to the large number of remains excavated from the Xagħra Circle, the sampling methodology employed in this study was selective, considering the following factors:

- Contexts covering the full chronology of site use;
- Spatial and stratigraphic location;
- Contexts containing a variety of depositional modes;
- Co-ordinating with other researchers to maximise the potential of the results;
- Accessibility of material in the archives.

Following this approach, key areas of the site were selected, including the rock-cut tomb (due to its early radiocarbon dates), the North bone pit (as it represents a range of depositional practices), and the West Cave (where much FRAGSUS analysis has been concentrated). The East Cave was largely excluded as the main context (1241) is only partially excavated (see Stoddart, Malone *et al.* 2009, 170). The Southwest niche in the East Cave was partially analysed as it has produced the earliest radiocarbon date from the site, while the Central bone pit was chosen due to the sequence of nonadult interments.

A target sampling threshold was established, to record contexts containing <1000 fragments in full and at least 10% of the assemblage in contexts containing >1000 fragments. In most cases, this has been achieved. Contexts (436), (734), (743) and (1307) were small, but a discrepancy was realised between the number of remains located in the archive and the NISP recorded in the monograph—likely due to further post-excavation disintegration and inconsistent archiving.[1] The original NISP is conservative as, in the case of (656), the sample recorded in this study is larger due to the inclusion of small, unidentifiable fragments.

Contexts containing 1000–10,000 fragments have almost all been analysed to at least 11% of the NISP as quoted within Malone *et al.* (2009). A total of >19,000 fragments were analysed, corresponding to 16.6% of the total NISP from the analysed contexts (Table 7.1). The spatial distribution of this sample is visualised in Figure 7.1. As detailed in §4.3.2, the full assemblage comprises ca. 220,000 fragments from >300 contexts. This sample consists of approximately

[1] Most boxes are labelled in ink on the exterior with a list of the contexts they contain, but in some cases this may not be comprehensive.

8.6% of the total assemblage and 18% of the total NISP of the contexts analysed. One significant result of this research is that some of the largest bone-bearing deposits at the site have been sampled to a high level: nearly 50% of (799), one of the richest levels in the North bone pit has been analysed, and 72% of (595) in the southwest niche was sampled. A further three large contexts have been partially sampled: (783) to almost 10%, (951) to 15%, and more than 25% of (960). In a few cases, it was possible to fully analyse contexts (656, 743, 1024). This chapter presents the results of taphonomic analysis of 16 contexts.[2] In the following section, overall results of the complete sample are outlined. Detailed results follow, organised according to spatial location and context.

Context	Location	Phase	NISP	No. Analysed	% Analysed
276	Rock-cut tomb: West	Ġgantija	~7000	1033	14.8%
326	Rock-cut tomb: East	Ġgantija	~3500	1050	30%
328*	Rock-cut tomb: East	Ġgantija	-	4	-
354	North bone pit	Early	1565	232	14.8%
436	East Cave: central bone pit	Late	383	235	61.4%
595	East Cave: Southwest niche	Early	3333	2414	72%
656	East Cave: Southwest niche	Early	241	401	100%
734	East Cave: Southwest niche	Early	82	54	65%
743	East Cave: Central bone pit	Late	145	120	82.8%
783	West Cave: Display zone	Latest	53,139	4953	9.3%
799	North bone pit	Early	4468	2066	46.2%
951	West Cave: Deep zone	Early	12,796	1923	15%
960	West Cave: ‘Shrine’	Latest	11,547	2953	25.6%
1024	West Cave: ‘Shrine’	Middle	145	194	100%
1144	West Cave: Deep zone	Middle/Late	1619	151	9.3%
1206	West Cave: ‘Shrine’	Late	6783	765	11.3%
1268*	West Cave: ‘Shrine’	Early	7823	233	3%
1307	West Cave: Deep zone	Early	465	278	59.8%

Table 7.1: Contexts analysed from the Xagħra Circle in this study. The Tarxien period is divided into early (2900–2700 BC), middle (2700–2500 BC), late (2500–2400 BC) and latest (<2400 BC) phases. *=excluded from further analysis.

[2] Contexts (328) and (1268) are excluded due to their small sample size. Analysis of (328) was abandoned as more detailed description of the deposit in (326) exists. Analysis of (1268) was abandoned as one articulated individual of interest could not be fully located.

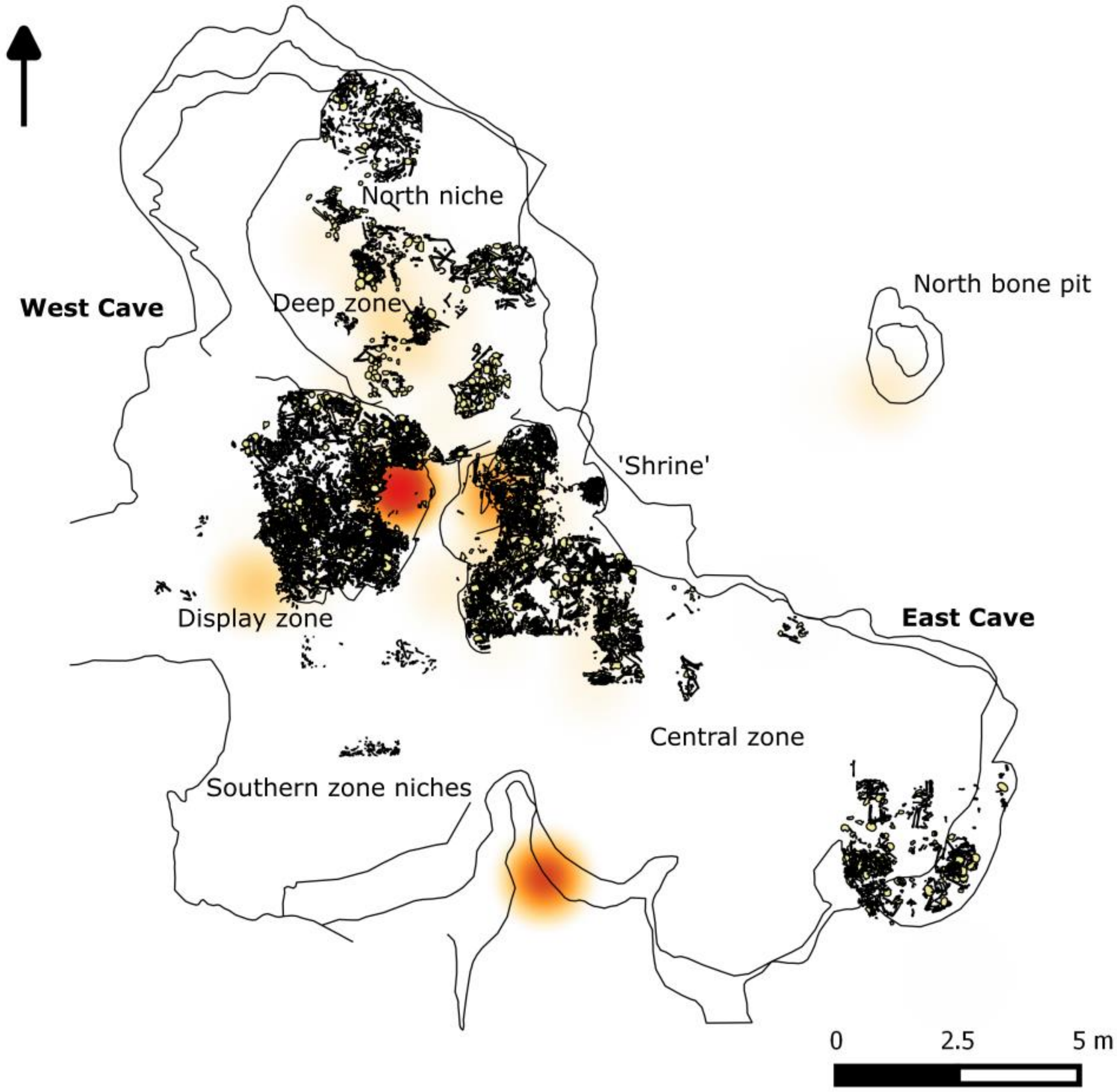


Figure 7.1: Heatmap of the Xagħra Circle with the location of remains analysed in this study indicated by orange hotspots; a larger sample is indicated by a deeper colour (map by Rowan McLaughlin).

7.2 Overview of the assemblage

Overall, the assemblage is highly fragmented, although complete elements or large fragments are occasionally present. Despite extensive fragmentation, cortical surface preservation is generally good, as is noted in the original analysis (Stoddart, Barber *et al.* 2009, 317). Of the full sample from the Circle, 19% was unidentifiable to element (*ibid.*). In this study, 36.9% was identifiable to broad region (cranial, long bone, vertebral, 'other') but not element, and most of these were <20 mm in maximum length. Smaller fragments were included in this study, resulting in a more detailed analysis of taphonomic processes affecting select areas of the site.

Mean fragment size in each context is between 21–50 mm (size classes 2 to 4) and is largely consistent across the sample (Figure 7.2). The inclusion of small fragments has resulted in the low mean; the range of fragment size extends to almost 40 cm, although only 9 recorded fragments exceeded 30 cm. Bone completeness is more variable (Figure 7.3). In general, most fragments represented 25–49% of the original element (API 2), and the mean API is 1.75 (std. dev. 0.01). On average, preservation was slightly better in (595), (1144), and in the shrine contexts (960) and (1206). Fragmentation is higher, with more incomplete elements, in (354), the basal context of the North bone pit, and (436) and (656) in the East Cave.

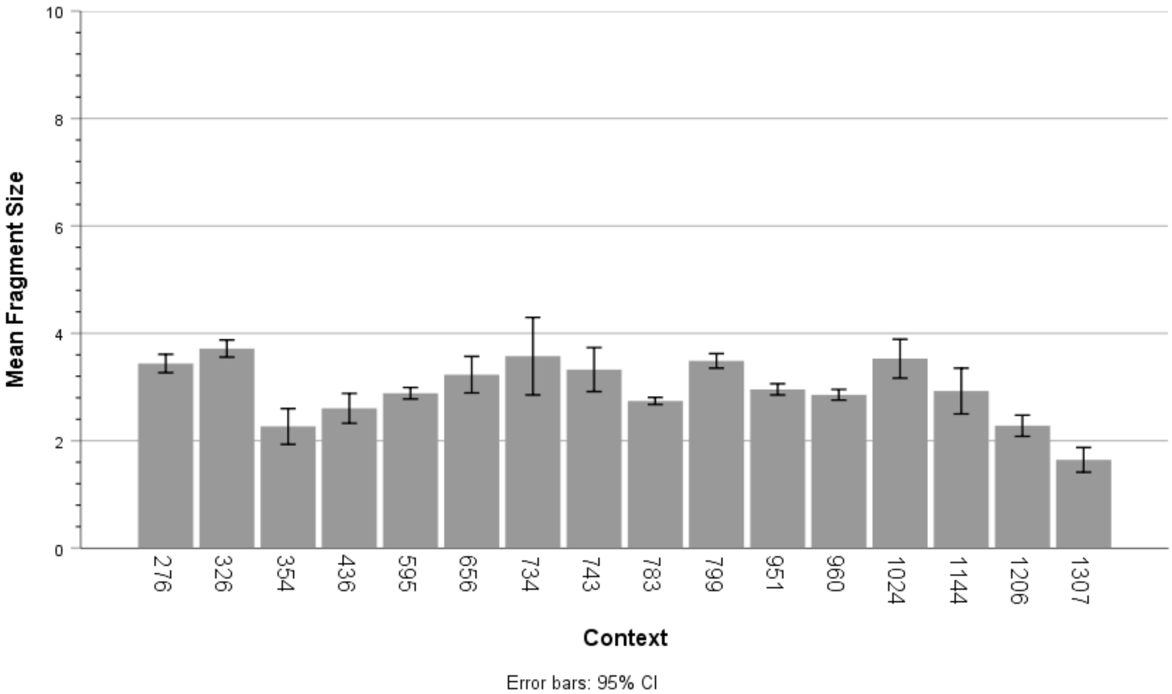


Figure 7.2: Mean fragment size across analysed contexts.

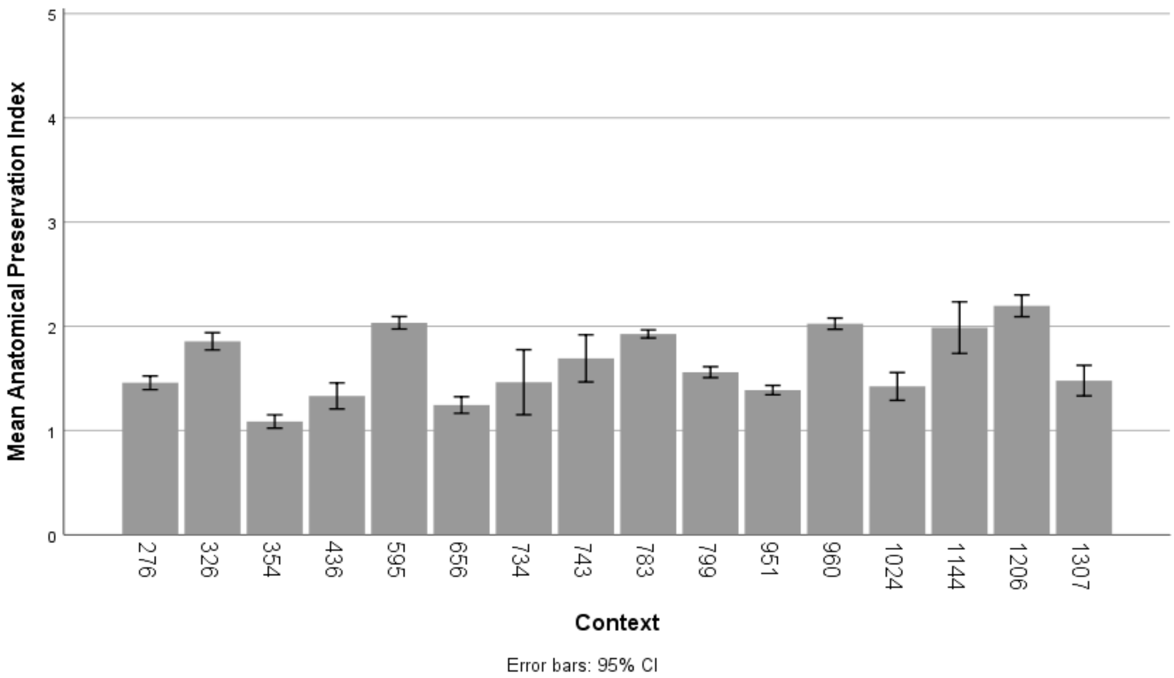


Figure 7.3: Mean element completeness (API) across analysed contexts.

Qualitatively, bone preservation is fair to good in many contexts, with a mean QBI of 2.46 (std. dev. 0.012) (Figure 7.4). An average of >50% (QBI 3–5) of the extant bone cortex is preserved on fragments from five contexts. These include those displaying higher than average quantitative bone preservation, as well as (783). While many of the factors which contributed to fragmentation may also have led to cortical degradation, this relationship is not always linear. Fragment size or element completeness is not always a predictor of qualitative preservation. Four contexts have a mean QBI of <1 (<24% of original cortex well-preserved), while the mean API results for these contexts is between 24–49% (API 1–2), indicating that in some cases cortical degradation has disproportionately affected some remains while not necessarily increasing their fragmentation.

In the following sections, each area analysed is discussed in turn and the results of all taphonomic variables presented, beginning with the features outside of the hypogeum (the rock-cut tomb and North bone pit) and then progressing from the West Cave to the East Cave. Overall results are summarised in Appendix 3.2 and MNE, MNI and BRI calculations for each context are presented in Appendix 3.4.

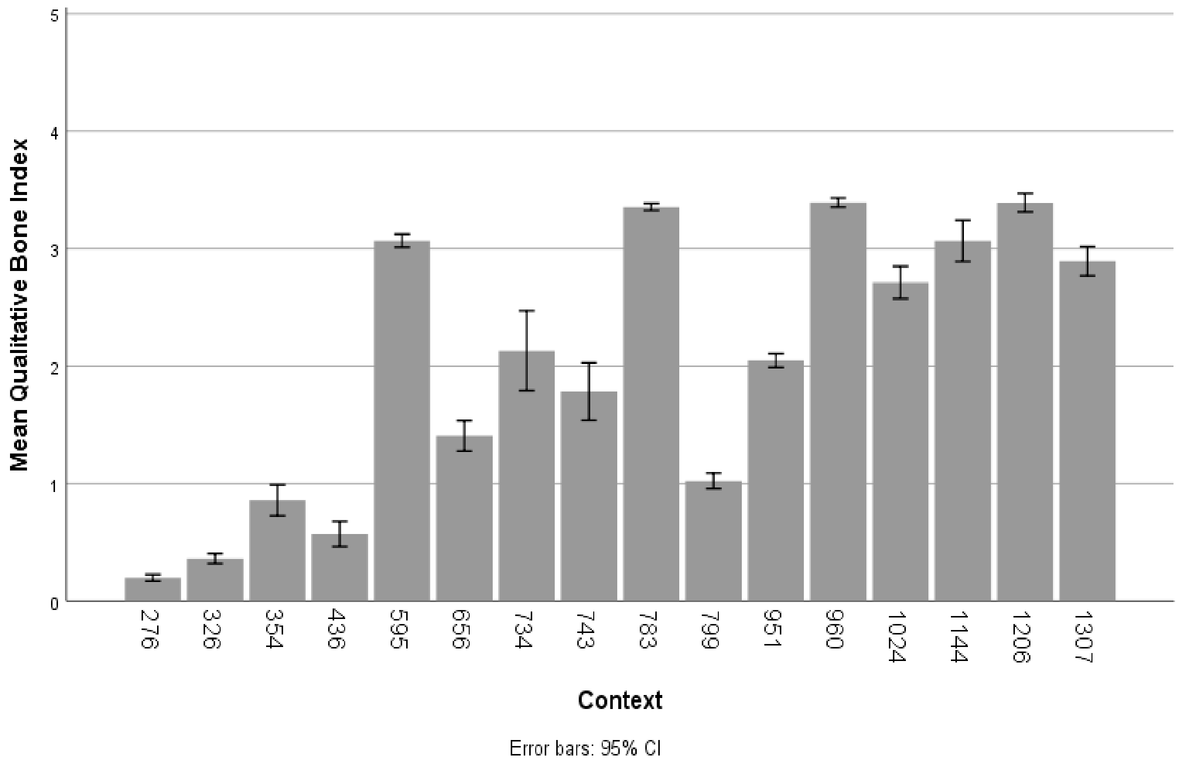


Figure 7.4: Mean element preservation (QBI) across analysed contexts.

7.3 Rock-cut tomb: (276), (326)

Deposition in the rock-cut tomb is dated to the Ġgantija period, with the start of activity between 3640–3500 cal BC (73% probability), lasting 170–505 years (95% probability) (Malone *et al.* 2019).

7.3.1 Completeness, preservation and fragment size

Fragmentation is high in the rock-cut tomb, with most fragments representing <25% of the original element (Figure 7.5). Cortical preservation is similarly poor, attributed to abrasion, ochre staining and sediment concretion (Figure 7.6). Completeness and preservation were further analysed according to bone type (Appendix 3.3). Most elements in both contexts were <25% complete, except for the extremities and patellae, which are largely between 75–99% complete. Vertebrae are fractionally better preserved in (326) than (276), and this accords with evidence for slightly better cortical bone preservation in the West chamber. In both chambers, most fragments displayed no unmodified cortical bone, largely due to discolouration and staining, although preservation was slightly better in the West chamber. Diagenesis was advanced, with the collagen content of the bone leached; many remains were post-depositionally fractured and heavily abraded. In some cases, the fracture margins and medullary cavity were not only encased in ochred sediment, but also abraded and polished. Some mineral encrustation was observed on a handful of elements (see §7.2.5).

Overall, the mean API is 1.66 (std. dev. 1.245) and the mean QBI is 0.28 (std. dev. 0.589), illustrating the high level of fragmentation and poor cortical preservation. Mean fragment size is 3.61 cm (std. dev. 2.754), with most <51 mm in maximum length, although two fragments exceeded 200 mm in length (Figure 7.7). The long duration of the tomb's use, as indicated by the Bayesian analyses, alongside successive deposition and manipulation, explains the high fragmentation and poor preservation of much of the deposit.

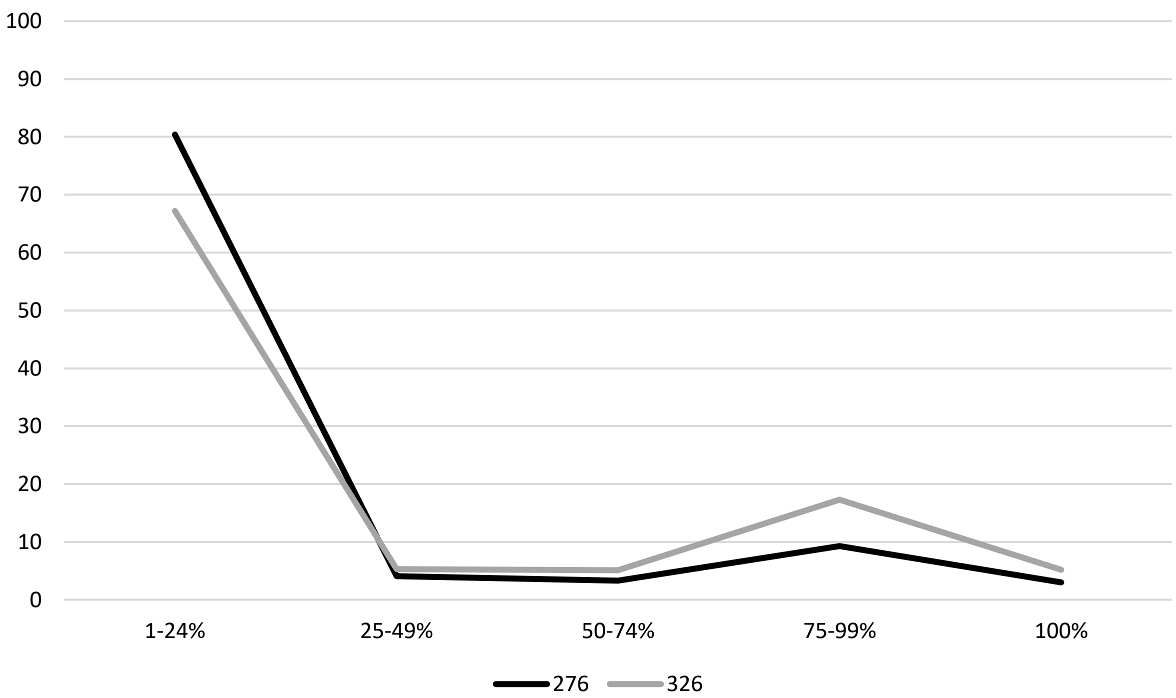


Figure 7.5: Bone completeness (API) in rock-cut tomb contexts.

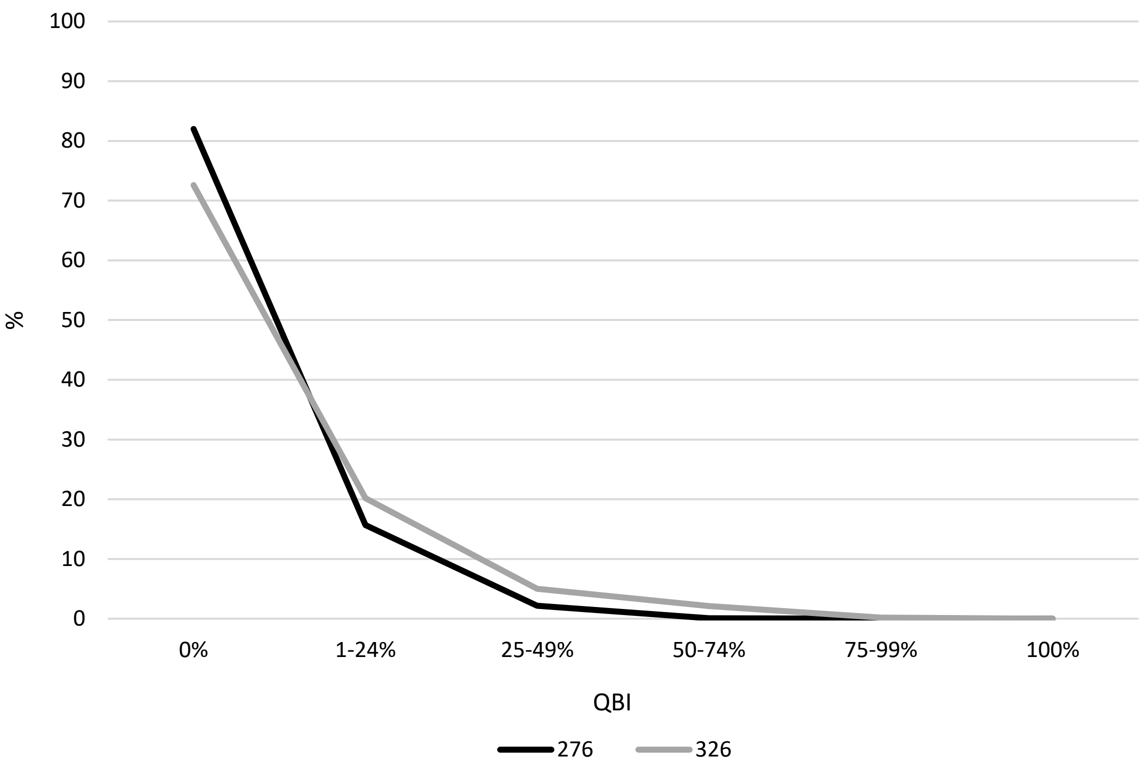


Figure 7.6: Bone preservation (QBI) in rock-cut tomb contexts.

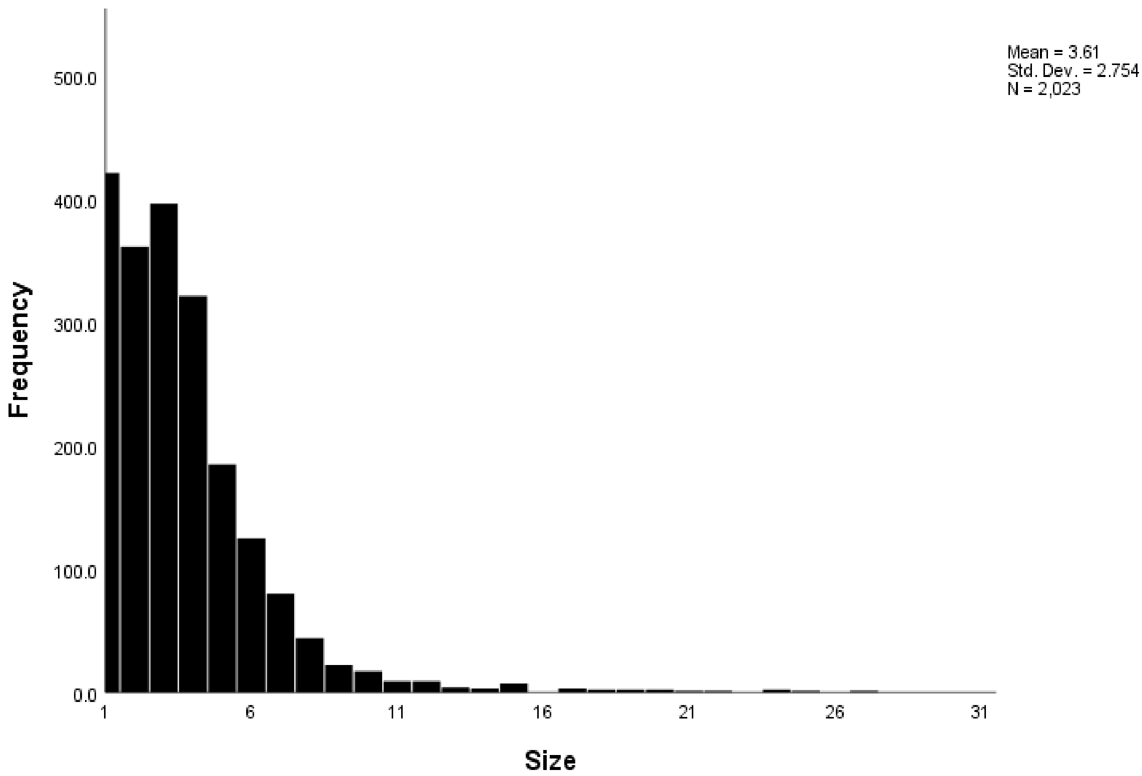


Figure 7.7: Fragment size distribution in rock-cut tomb contexts.

7.3.2 Fracture morphology

Fragmentation margins on long bones almost exclusively displayed dry bone fractures. The mean total FFI across both contexts from the rock-cut tombs is 5.99 (std. dev. 0.125) (Figure 7.8). Excavation damage was noted on 85 fragments (4.1%).

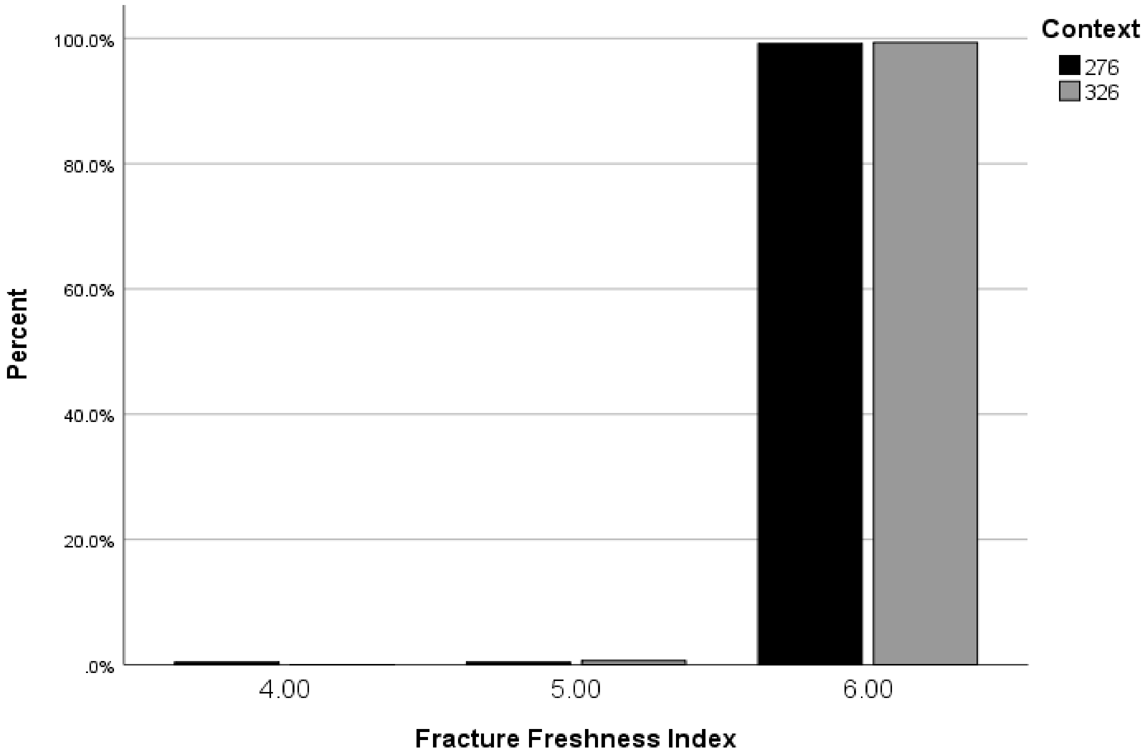


Figure 7.8: Total FFI recorded for long bone fragments in rock-cut tomb contexts.

7.3.3 Weathering

Weathering was observed on 16.6% of the sample and was slightly more prevalent in the West chamber. The mean score is 0.43 (std. dev. 1.078), though all stages of weathering were observed (Figure 7.9). Weathering is present on most elements but particularly skulls and long bones, with splintering evident only on long bones (Figure 7.10). Overall, weathering appears higher in the Xagħra rock-cut tomb than at the Xemxija Tombs (see §6.3.3). However, like the Xemxija Tombs, repeated wet/dry cycles, tumbling of bones within the small chambers, and the pressure of overlying deposits may be responsible for these modifications.

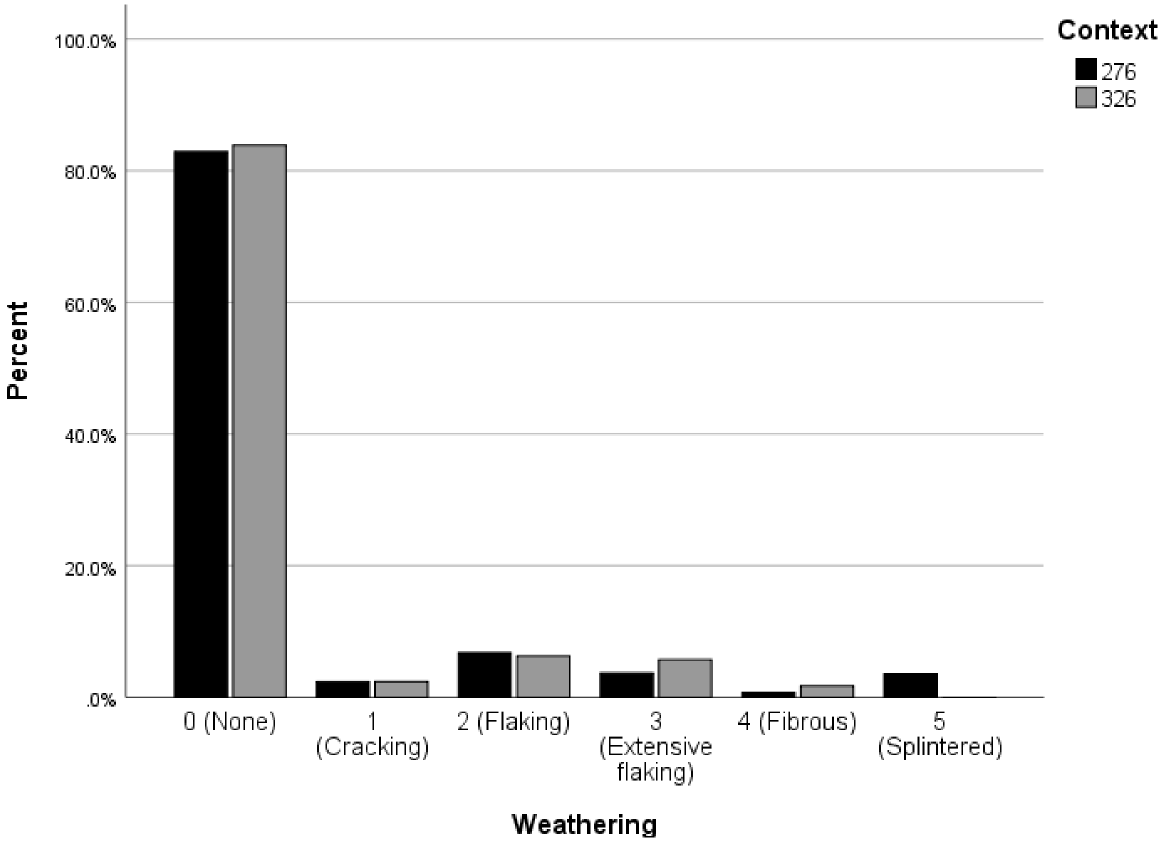


Figure 7.9: Weathering in rock-cut tomb contexts.

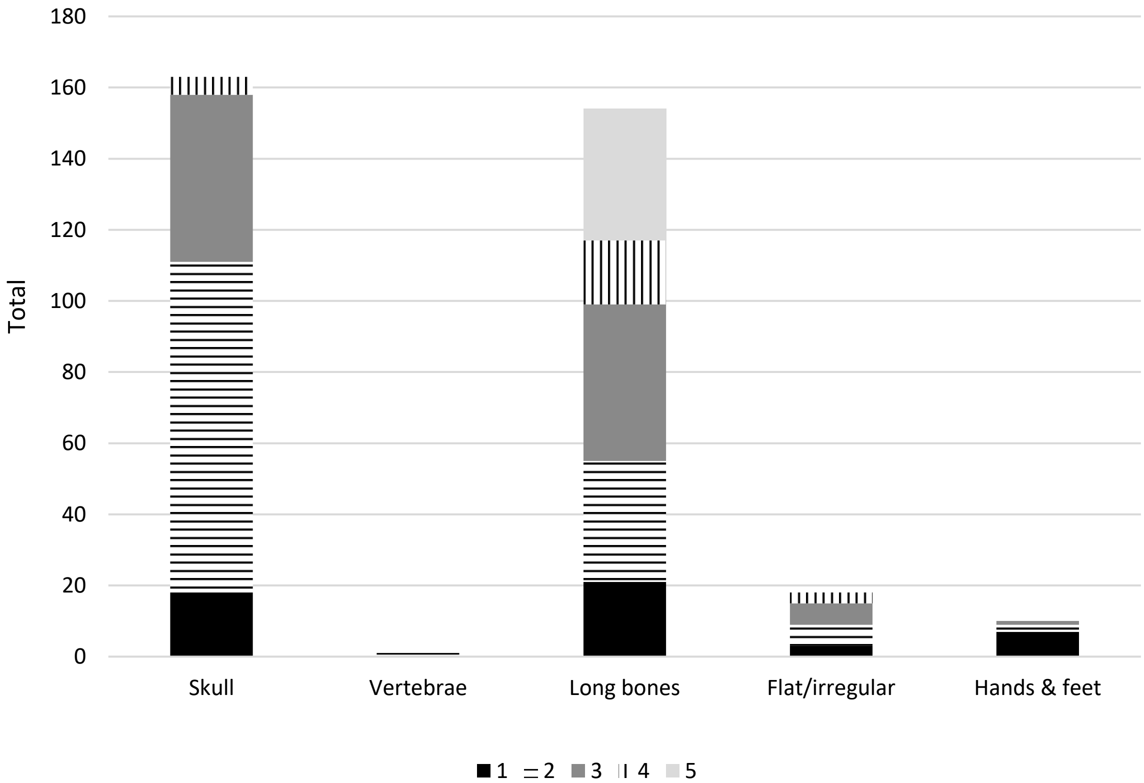


Figure 7.10: Weathering scores divided by bone type in rock-cut tomb contexts.

7.3.4 Abrasion and erosion

Abrasion and erosion were present on 20.6% of the sample and were again more prevalent in the West chamber (14.8%, compared to 5.8% in the East chamber). Abrasion was generally slight to moderate in extent (affecting <50% of the cortical surface) with a mean score of 0.15 (std. dev. 0.5) (Figure 7.11). This does not solely account for the extent of poor preservation in the rock-cut tomb, with discolouration and concretion also affecting preservation (see below). Abrasion and erosion were observed on all skeletal elements but were more extensive on long bone fragments (Figure 7.12). In contrast to weathering, abrasion and erosion were present on more of the axial skeleton, pectoral and pelvic girdles, and extremities. This may indicate that abrasion and erosion mostly occurred *in situ* and can be accounted for by depositional circumstances, including continued disturbance of deposits and root erosion.

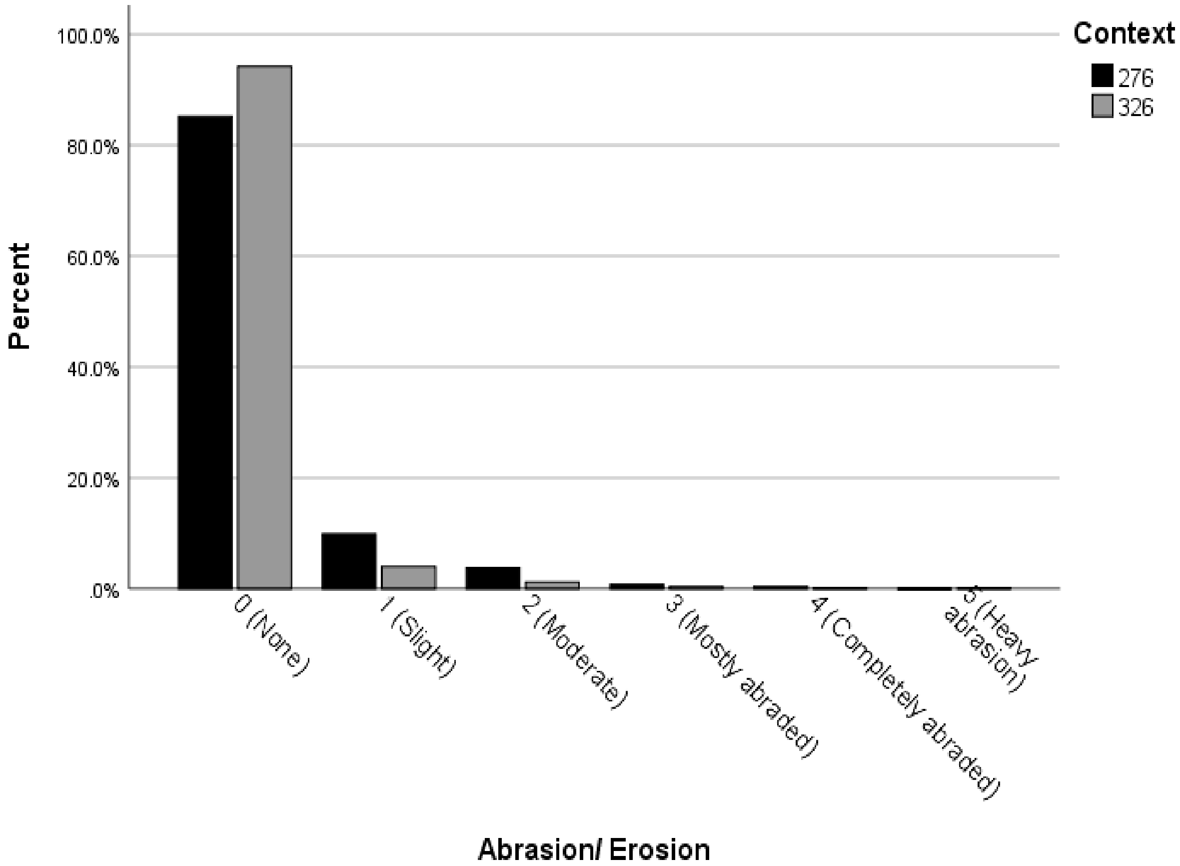


Figure 7.11: Total scores for abrasion/erosion in rock-cut tomb contexts.

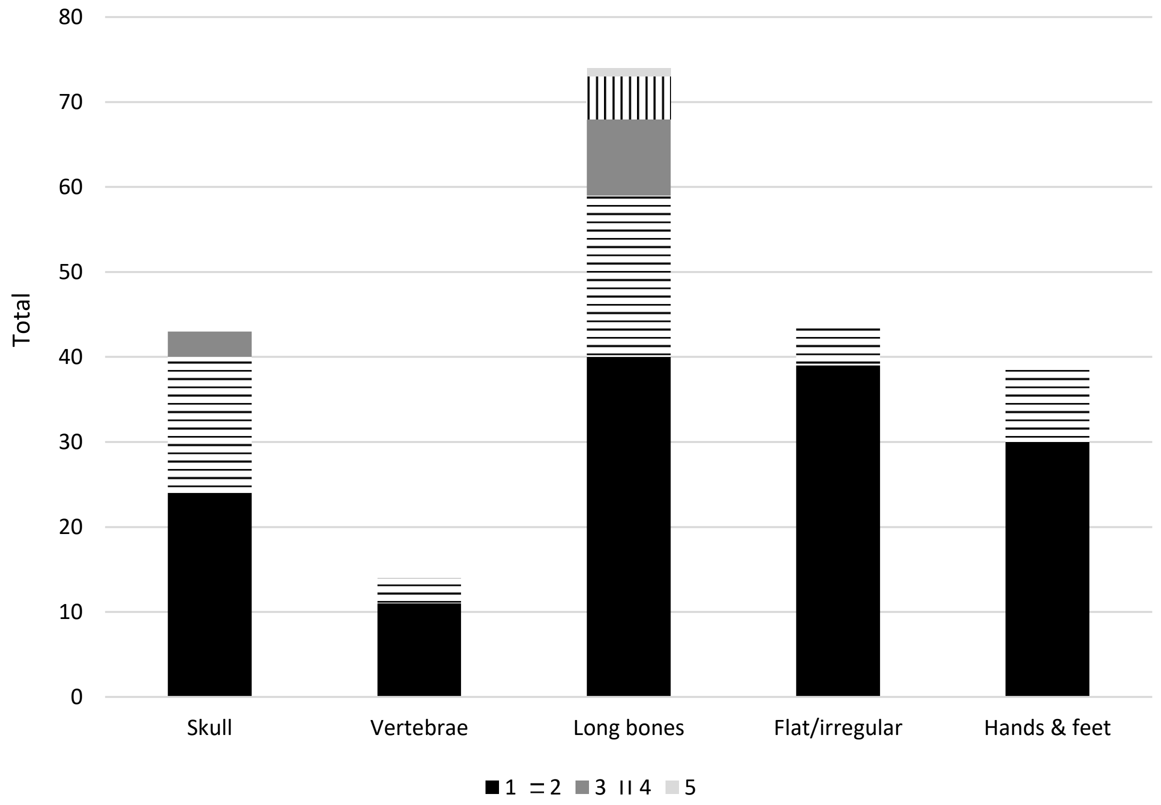


Figure 7.12: Abrasion/erosion scores divided by bone type in rock-cut tomb contexts.

7.3.5 Discolouration and burning

In (276), 73.1% of the sample exhibited discoloured cortices, while in (326), discolouration was observed on 92.9% of the sample. Most discolouration is due to ochre staining, and the remainder is the result of soil staining and concretion, including limestone adhesion and mineral crystallisation (Figure 7.13)

Burning was present on 18 fragments in the East chamber, occasionally alongside ochre staining; this was not noted in the original analysis of the material (Duhig in Malone *et al.* 1995, 335–341; Malone, Stoddart *et al.* 2009, 95–102). Most of these fragments were cranial bones displaying blackened endocranial surfaces (Figures 7.14–15), alongside fragments of long bones, vertebrae, ossa coxae and a calcaneus. The cranial fragments may all derive from the same individual, as some refits are observed. Of these, burning did not penetrate the outer table and is uneven across the extant endocranial surface, suggesting that fragmented remains were exposed to flames at a low heat for a limited period. No evidence of burning was observed on the sample analysed from the West chamber.

Figure 7.13: Mineral concretion on first metacarpal (fragment 14086); scale: 1 cm. Photo by author.

Figure 7.14: Burning on endocranial surface of fragments from (326); scale: 1 cm. Photo by author.

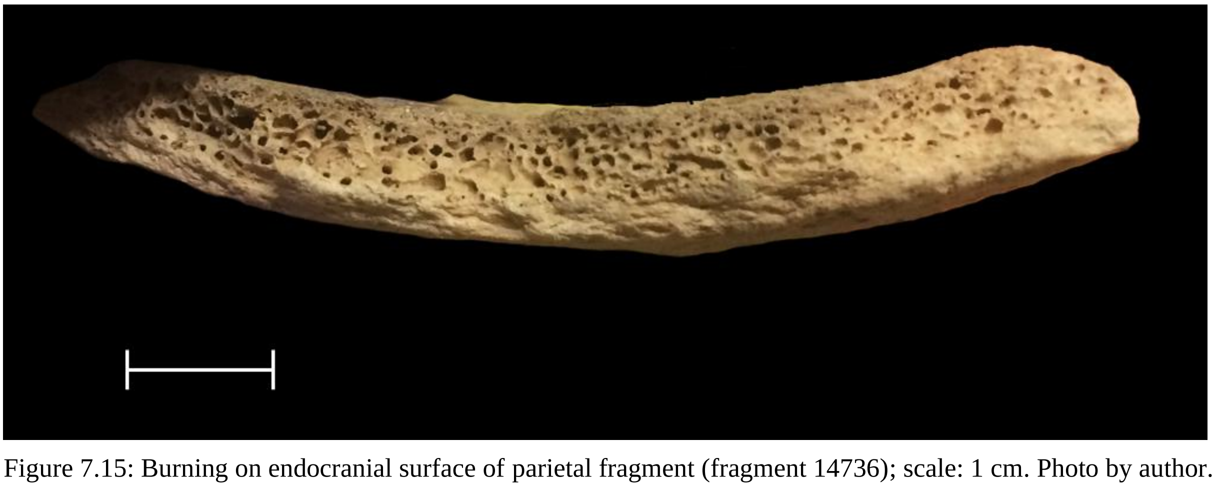


Figure 7.15: Burning on endocranial surface of parietal fragment (fragment 14736); scale: 1 cm. Photo by author.

7.3.6 Insect damage

Bores attributed to dermestid beetles were observed on a right humerus and femur from the West chamber. The humerus exhibited numerous bores on the anterior and lateral aspects of the distal metaphysis and epiphysis (Figure 7.16). The femur exhibited >7 bores on the posterior aspect surrounding the *linea aspera* and ochre was observed within the bores (Figure 7.17). The bores are approximately 2–4 mm in diameter and comparable in morphology to the modifications observed on the Xemxija remains (Thompson *et al.* 2018). These indicate either exposure of selective remains prior to deposition or the transport of dermestids into the tomb through organic materials.

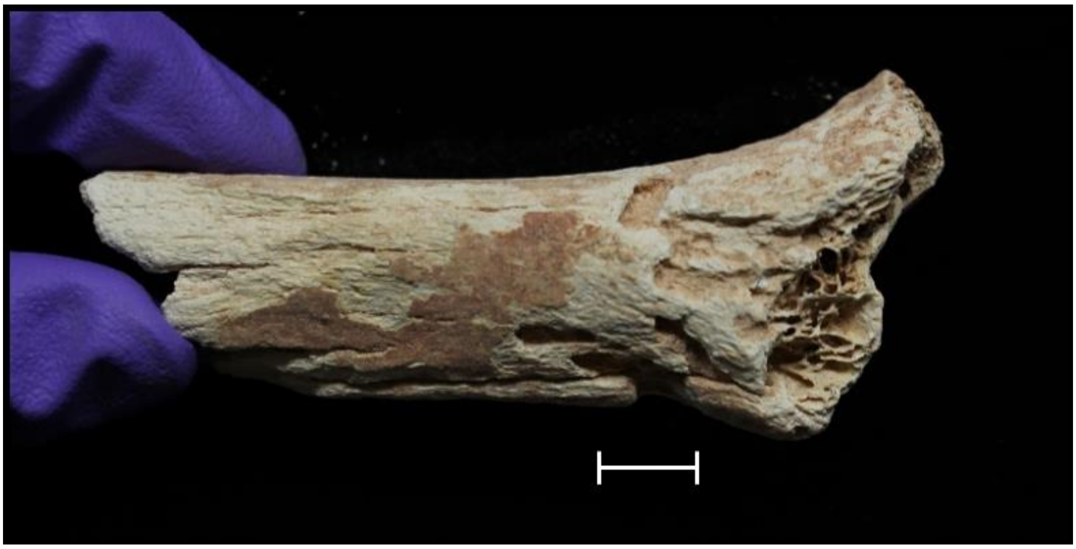


Figure 7.16: Dermestid bores on humerus (fragment 15216); scale: 1 cm (photo by author).

Figure 7.17: Dermestid bores on femur (fragment 3076); scale: 1 cm (photo by author).

7.3.7 Articulation

No good quality photographs exist of the rock-cut tomb deposits from which to assess *in situ* articulation. However, excavation observations and plans (see Figure 4.13) noted more articulations within the East chamber. These included a contracted male skeleton, a lower arm, and partially preserved adult, adolescent and child remains. The lower arm was noted to be separated from the hand at the wrist, but the hand bones remained articulated (Stoddart, Barber *et al.* 2009, 319). This observation suggests that the humero-ulnar joint was disrupted while preserving the hand in articulation, as the carpals comprise a labile joint. This represents a reversal of the typical order of disarticulation and may demonstrate intentional and careful manipulation of the remains.

7.3.8 Skeletal element representation

SER in both chambers is particularly low and uneven (Figure 7.18). In the sample analysed, only crania and patellae in the West chamber (276) represented >50% of the MNI. In the West chamber coccyges and patellae are absent, in the East chamber no manubria were observed and, in both contexts, the hyoid is absent. This reflects the expected pattern of degradation of small and fragile elements. Similar patterns are observed in both contexts, with crania well-represented (37.5% in the West chamber and 86% in the East chamber), mandibles slightly less well-preserved (31% and 43% respectively), low representation of the axial skeleton and most of the pectoral girdle, and higher numbers of long bones and small bones. Long bone representation in (276) ranges from 12.5–31% (the femur being the best represented), and in (326) from 14–36% (with the radius most prevalent). Most elements of the limbs and extremities are better represented in the East chamber, correlating with the higher prevalence of weathering and abrasion/erosion in the West chamber. Alongside crania, patellae are the best-represented element in the East chamber (57%), and ankle and pedal elements are notably well represented (38–45%). In the West chamber, the talus is the most prevalent element (43%).

In both contexts, there is a weak signal of residuality, with small bones accounting for a greater proportion of the MNI than other elements. However, high fragmentation of more robust elements has almost certainly suppressed their representation, while the abundance of crania in the East chamber illustrates their curation. The Xemxija Tombs assemblage presents a much stronger residual signal, with a greater difference between the highest and lowest BRI scores (70.9% for metatarsals and 1.8% for manubria). Overall, therefore, the pattern of element representation largely reflects successive deposition and extensive disturbance. Primary deposition is clearly indicated in both chambers through the presence of small bones. The absence of hyoids, as well as coccyges and patellae in the East chamber, is most likely an artefact of sample size and does not reflect real depositional practices.

Practices were distinct in each chamber. More extensively weathered and abraded bones were encountered in the West chamber, alongside dermestid bores on two elements. This may suggest rare secondary deposition, but more likely reflects a longer period of use and increased disturbance. This is supported by the higher MNI from this chamber (see §4.3.3.1). In contrast, the East chamber presents slightly better preservation, alongside a higher representation of long bones, consistent with the evidence for *in situ* articulation (Malone, Stoddart, Trump *et al.* 2009, 100). This analysis has revealed charring on several elements (including at least one cranium) from the East chamber, demonstrating the exposure of a discrete area of bone to an open flame. Furthermore, the over-representation of crania within this chamber may suggest their preferential curation, although this pattern is not borne out in the original analysis (compare to Figure 4.19). These results refute at least one of the current interpretations, suggesting that the tombs were almost solely used for primary deposition of corpses (Duhig in Malone *et al.* 1995, 341; Malone, Stoddart, Trump *et al.* 2009, 102). Remains were subject to clearance and rearrangement on the event of a new interment, perhaps occasionally sorted or carefully manipulated, and fragmented as a result of sequential deposition.

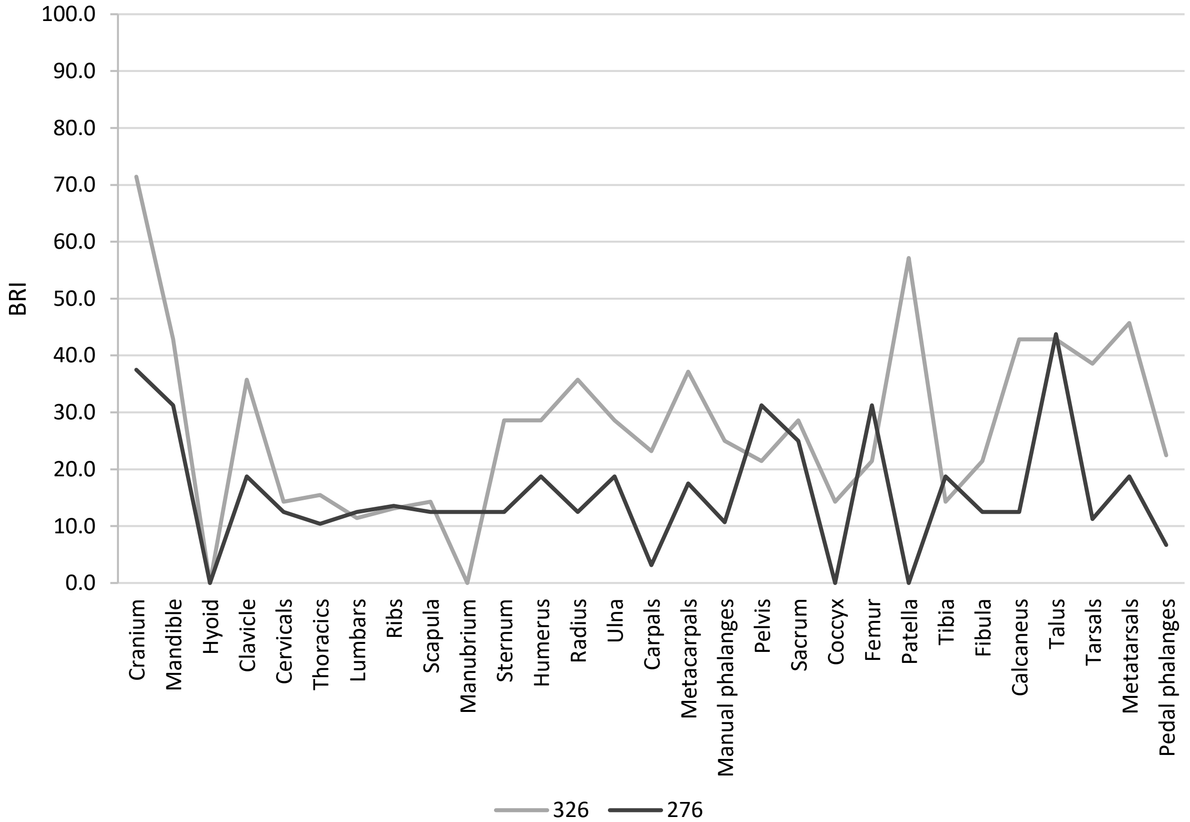


Figure 7.18: Skeletal element representation in (276) and (326) from the rock-cut tomb.

7.3.9 Summary of the rock-cut tomb

Most remains from the rock-cut tomb were poorly preserved, often with ochre and sediment staining and/or adhering to the cortical surface. Bone completeness and preservation was fractionally poorer in the West chamber, alongside elevated levels of abrasion/erosion and weathering, compared to the East chamber (Table 7.2). A few fragments displaying insect damage were noted in (276), and there was some evidence of burning in (326). No animal gnawing was observed, and no cutmarks were present, consistent with previous analyses (Duhig in Malone *et al.* 1995, 340). Overall, SER illustrates primary, successive deposition of corpses, and the extensive disarticulation encountered during excavation is most likely due to clearance and rearrangment of remains between interments.

Taphonomic feature	276 (West)	326 (East)
<5cm in size	73.3% (n=757)	71% (n=746)
<1/2 complete	84% (n=868)	72.6% (n=762)
<1/2 surface well preserved	96.6% (n=998)	92.5% (n=971)
Abrasion/erosion	14.8% (n=153)	5.8% (n=61)
Weathering	17.1% (n=177)	16% (n=169)
Burning	0	1.7% (n=18)
Insect damage	0.2% (n=2)	0
Rodent gnawing	0	0
Cutmarks	0	0
MNI	8	7
Total analysed	1033	1050

Table 7.2: Summary of taphonomic results from rock-cut tomb contexts.

7.4 North bone pit: (354), (799)

Two contexts from the North bone pit were sampled: (354) from the upper layers (levels 1–9), and (799) from the lower levels (22–39) (Table 7.3). (799) is a large context, including an articulated adult male alongside many disarticulated remains (see Figure 4.14). Bones from a range of levels within these contexts were studied. Minimal articulations were observed post-excavation (only a corresponding calcaneus and talus), although site records note some cases of *in situ* articulation, discussed in §7.4.7.

7.4.1 Completeness, preservation and fragment size

The majority of remains from the North bone pit were highly fragmented, with most of the sample from each context representing <25% of the complete element (Figure 7.19). Fractionally better preservation is evident in (799), from which almost 20% represented >75% completeness. Overall, the mean API for both contexts is 1.51 (std. dev. 1.178). Cortical preservation differs between the two contexts. Slightly better preservation is observed in (354), with >30% of fragments 25–49% well-preserved (Figure 7.20). The lack of good cortical preservation is largely due to sediment adhesion and concretion, although greater cortical degradation in (799) may be due to abrasion and compaction caused by overlying deposits. The mean QBI is 1.01 (std. dev. 1.472). Most remains are <61 mm in maximum length (Figure 7.21) and mean fragment size is 3.36 cm (std. dev. 3.08), demonstrating high fragmentation.

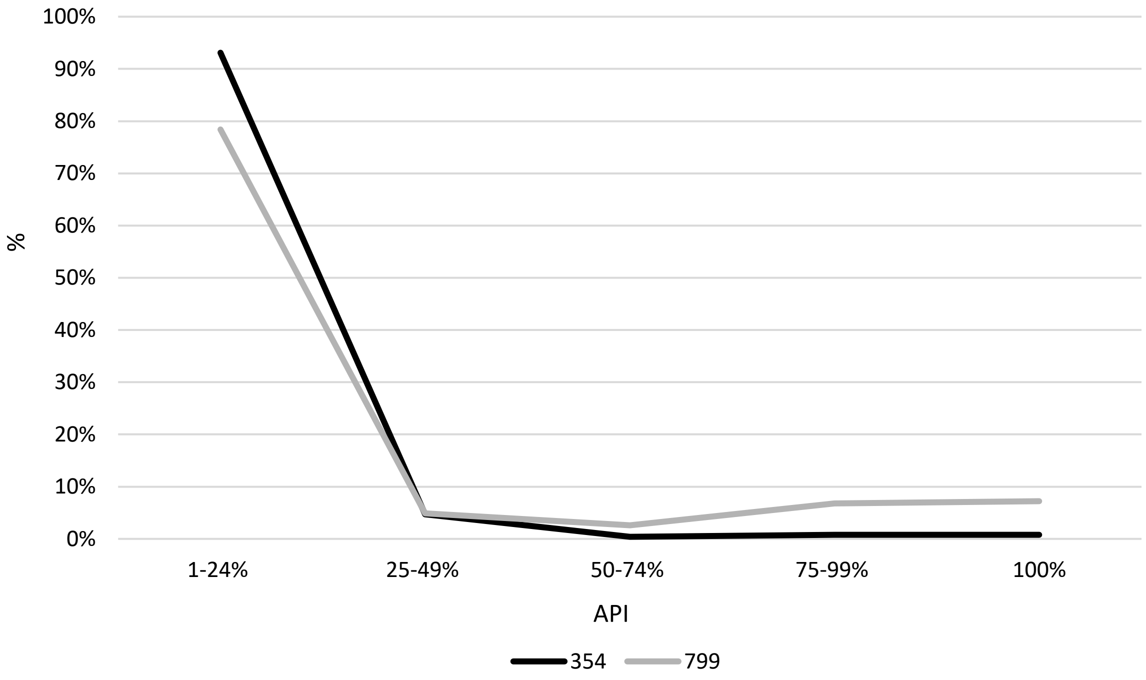


Figure 7.19: Bone completeness (API) in North bone pit contexts.

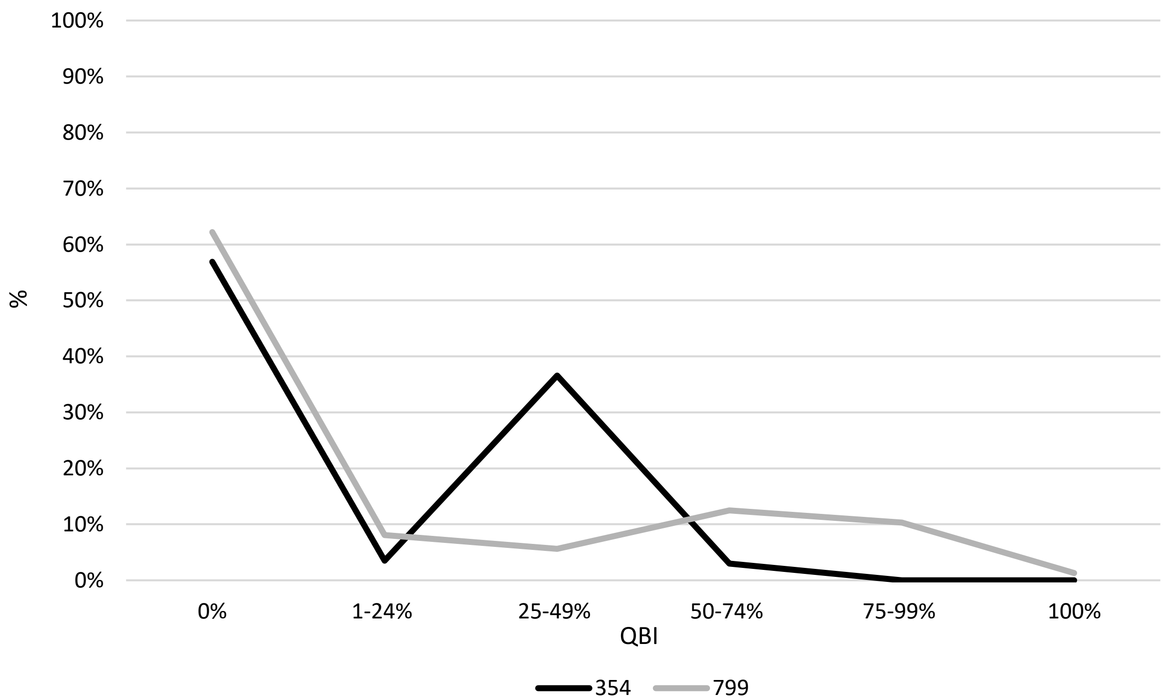


Figure 7.20: Bone preservation (QBI) in North bone pit contexts.

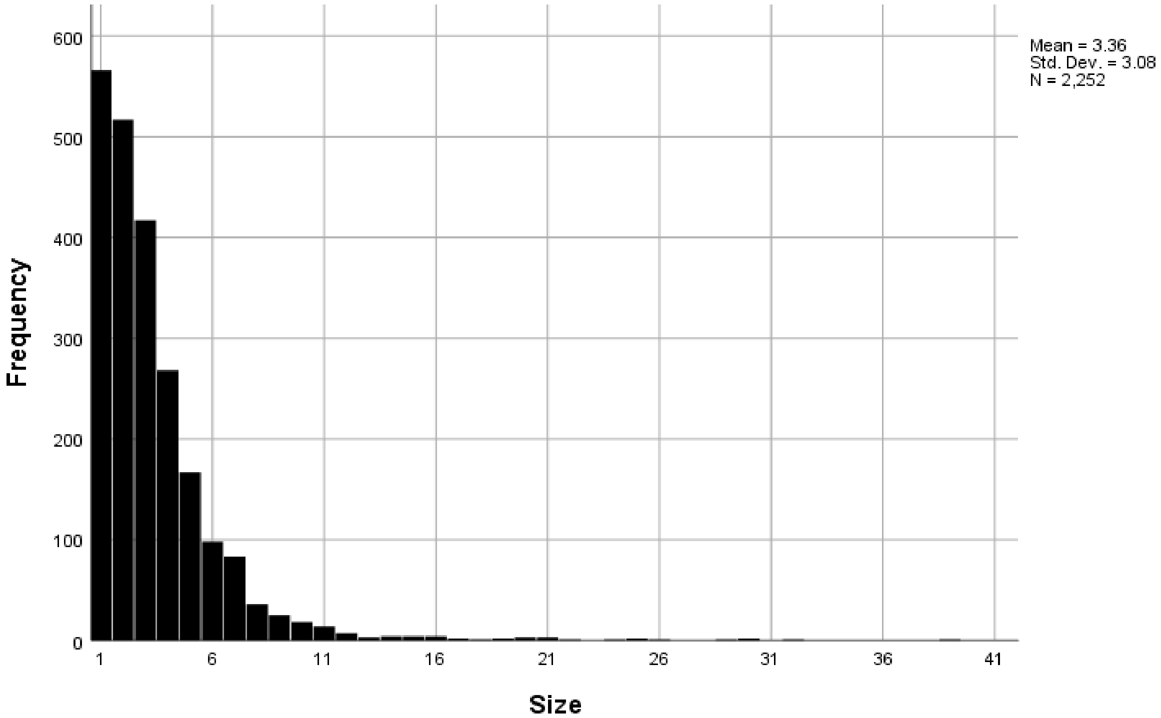


Figure 7.21: Fragment size distribution in North bone pit contexts.

7.4.2 Fracture morphology

Long bone fragmentation exclusively displayed characteristics of dry bone fractures. The mean total FFI across both contexts from the North bone pit is 5.97 (std. dev. 0.179) (Figure 7.22). Excavation damage was noted on 62 fragments (2.7% of the assemblage).

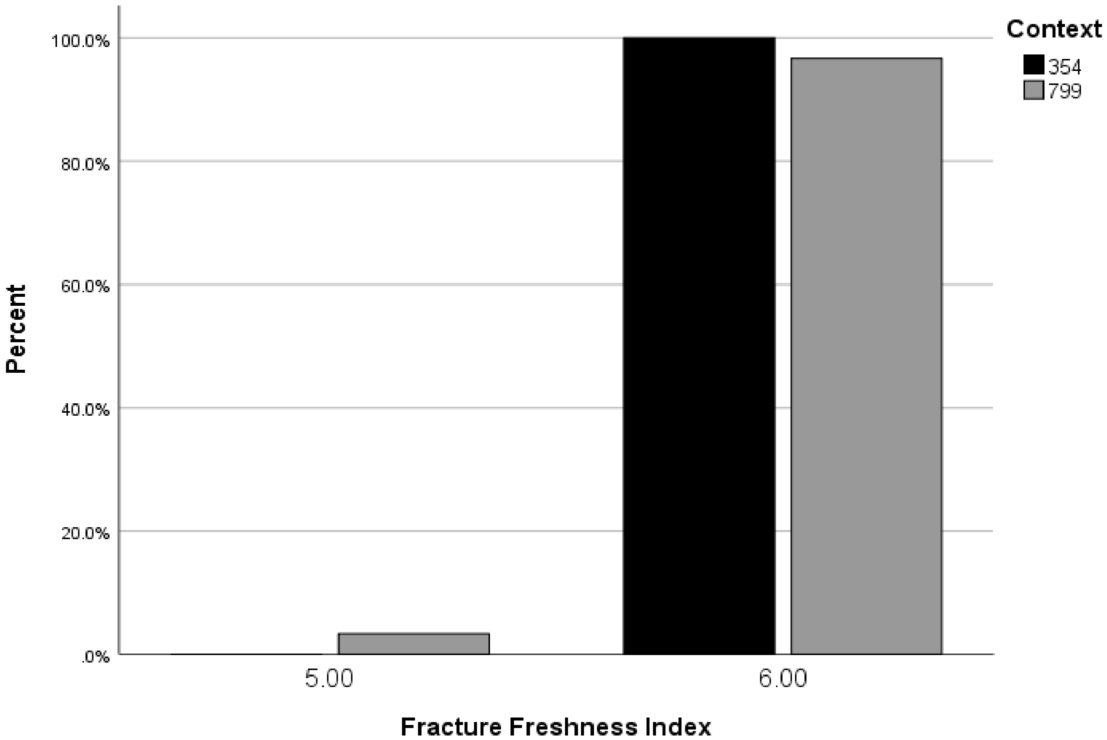


Figure 7.22: Total FFI recorded for long bone fragments in North bone pit contexts.

7.4.3 Weathering

Weathering was observed on <1% of the sample, with only 7 fragments in (799) displaying cortical flaking (Figure 7.23). Although much of the deposit in this area is disarticulated and likely the result of secondary deposition (Stoddart, Malone *et al.* 2009, 117), the lack of weathering indicates that remains were redistributed from their primary location without intermittent exposure.

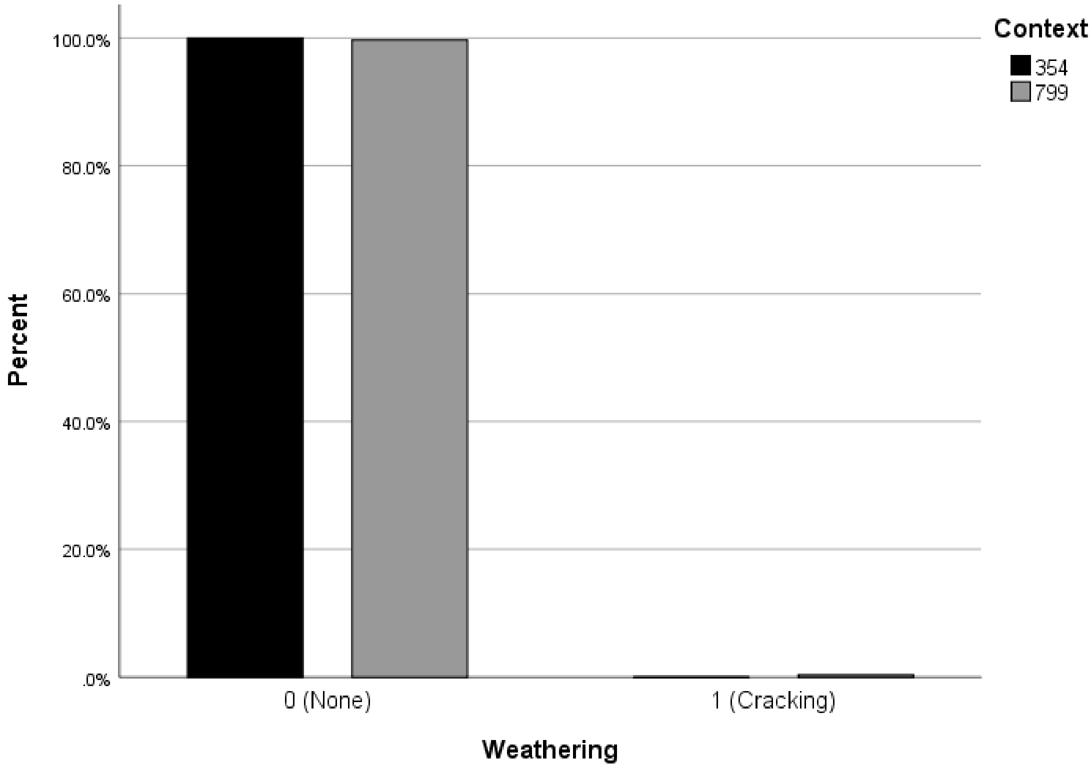


Figure 7.23: Weathering in North bone pit contexts.

7.4.4 Abrasion and erosion

Abrasion and erosion were observed on 14% of the sample and were marginally higher in (799). The extent of abrasion and erosion was minimal, with most attributed to root etching, producing a mean overall score of 0.08 (std. dev. 0.288) (Figure 7.24). Abrasion and erosion do not wholly account for the poor preservation of cortices, which is largely due to sediment concretion.

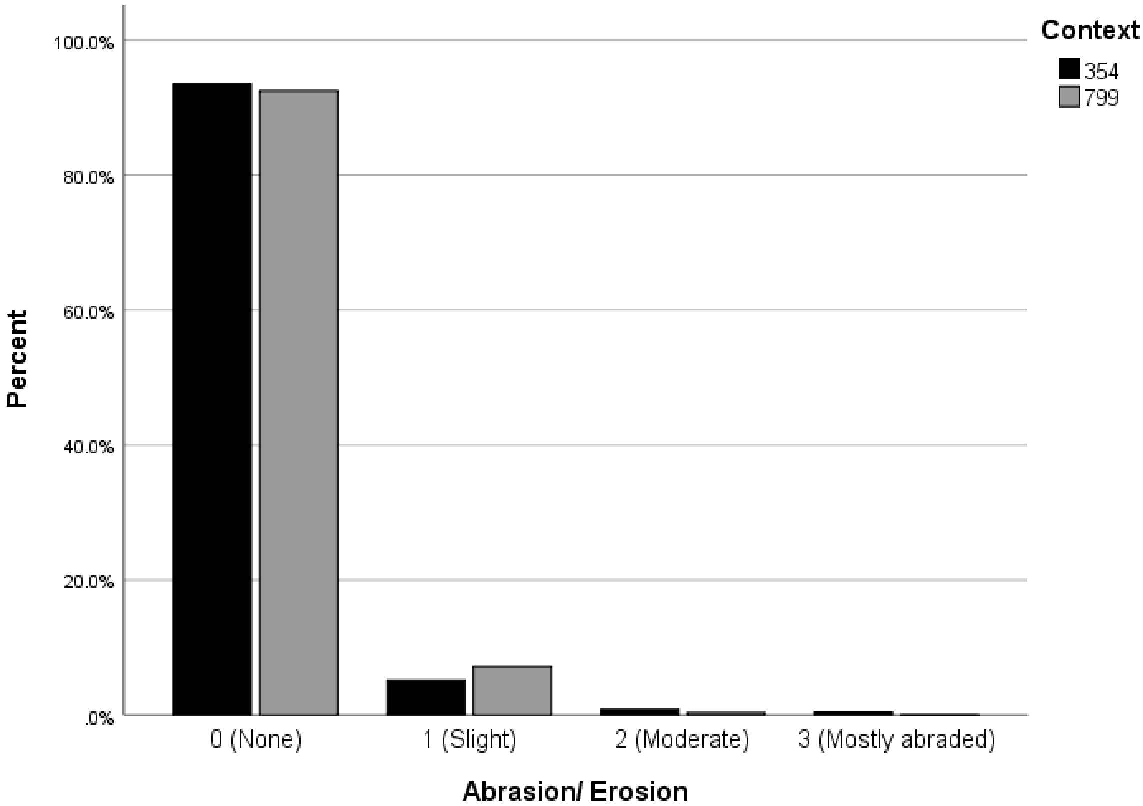


Figure 7.24: Total scores for abrasion and erosion in North bone pit contexts.

7.4.5 Discolouration

Five fragments displayed discolouration attributed to mineral and organic staining. There was no evidence of burning.

7.4.6 Insect damage

Two long bone fragments (left tibia and right femur) from the articulated adult male in (799) displayed modifications consistent with dermestid beetle damage. On the tibia, a single bore was located mid-diaphysis on the postero-lateral aspect. On the femur, a cluster of four incipient pits and an isolated single incipient pit (~1 mm diameter) were observed on the *linea aspera* in localised areas of cortical erosion, which may be the result of grooves etched by dermestid gnawing (Figure 7.25). Evidence for dermestid beetle presence on the remains of this individual suggest at least two hypotheses: (1) a period of sub-aerial exposure of the corpse, during which dermestids were able to colonise the remains; (2) organic (possibly hide) wrappings on the corpse, in which dermestid larvae were present.

Figure 7.25: Insect damage on the posterior aspect of a femur (fragment 784); scale: 1 cm (photo by author).

7.4.7 Articulation

There was minimal evidence of *in situ* articulation in the North bone pit, other than the adult male inhumation in the lower levels of (799) (see Stoddart, Barber *et al.* 2009, 322). There is some recorded evidence of *in situ* articulation in (354).

7.4.7.1 Articulated adult male in (799)

An adult male was laid in a flexed position on their right side, orientated north to south (head to the north, facing west) in the lower levels of the pit (Figure 7.26). Owing to the presence of intact labile articulations, including the manual and pedal phalanges and the acetabulo-femoral joint, this individual was deposited soon after their death. The pelvis had not collapsed, nor had the patellae fallen. This may be due to restriction caused by the edges of the pit at the level of the pelvis, as well as the fact that the legs were positioned at an incline at the western edge. It is possible the body was covered following deposition, preserving the labile articulations. The clavicles were inferiorly displaced at the medial aspect; this 'verticalization' is attributed to constriction of the shoulders (Duday 2009, 45–46), in this case likely due to the wall of the pit. The hips were flexed approximately at a right angle, achievable with soft tissue preservation, although the proximity of both the lower arms and lower legs suggests some movement of the elements after soft tissue decomposition. The position of the left proximal fibula supports this suggestion, as it has rotated posteriorly. Both feet are hyper-supinated, which may have been caused by the presence of an object between the feet.

This individual was well preserved *in situ* but fragmented during excavation. Excavation records note that the skeleton was lifted in parts over a few days as the remains were encountered throughout multiple levels. On the last day of excavation, heavy rainfall the previous evening adversely affected conditions, obscuring the visibility of the skeletal material from the right side (particularly from the pelvis down). The skeleton is represented by a total of 404 fragments, ranging in size from <10 – >300 mm. Fragmentation morphology is mixed, with fractures to dry bone due to post-depositional processes and excavation trauma. Root etching was present on 10% of the remains (n=42), including the frontal, foot bones, and eight loose teeth.

Figure 7.26: Adult male inhumation in (799) (photo from BRX archive).

7.4.7.2 In situ articulation in (354)

In (354), the site notebook records an articulated foot (Figure 7.27) as well as a group of long bones containing a tibia, fibula, radius and ulna in close association (Figure 7.28). This suggests either: (1) some further depositions in the North bone pit were of primary individuals that were later disturbed, or (2) secondary deposition of articulated extremities or limbs were occasionally made. In both cases, some soft tissue preservation would have been necessary to ensure continued articulation of elements when transported to the pit. On the basis of the mostly disarticulated deposits in this area, the second hypothesis may be more probable, suggesting that the pit deposit built up largely through periodic re-deposition of remains and body parts from their primary location in the hypogeum. Yet, there is no evidence for intervention with fleshed remains or fresh bones in the form of cutmarks or fresh fractures; thus, the means by which some limbs and body parts were disarticulated is unclear.

Figure 7.27: Articulated foot in Quadrant 8B, bone number 129 (BRX archive notebook 5, pp. 74).

Figure 7.28: Tibia and fibula overlying radius and ulna, both lower limbs in anatomical relationship (BRX archive notebook 5, pp. 77).

7.3.8 Skeletal element representation

Element representation reveals distinct practices in each context (Figure 7.29). Secondary deposition of selected elements is evident in (354), while a mixture of primary and secondary practices is apparent in (799) (Thompson 2017). In (799), all elements are present but unevenly represented. The mandible, pelvis and fibula are the most prevalent elements. The presence of small and friable bones, including the hyoid and sternum, reflects primary inhumation—perhaps not just of the adult male discussed above—although this was certainly not the dominant practice.[3] High fragmentation and disarticulation indicates that if any further inhumations were made in this area, they were extensively manipulated. The discrepancy between crania (56%) and mandibles (83%) may suggest either selective re-deposition of mandibles in this pit, or their removal. Secondary deposition is clearly indicated by the over-representation of specific bones, notably the fibula (83%).

The sample from (354) is not fully representative of the complete context, due to the high number of small fragments encountered, resulting in an MNI of 3 adults. Crania are the best represented element (67%), demonstrating their curation and selective re-deposition, alongside the apparent secondary deposition of the pelvic girdle (33–50%) and fibulae (17%). The original analysis noted an equal representation of mandibles, humeri and femora, although the curation of crania is also attested in the full deposit (Stoddart, Malone *et al.* 2009, 118). Radiocarbon dates indicate that at least one cranium in (354) pre-dates the deposit in (799), and there is further evidence of curation in (699) (Malone, Stoddart and Cook 2009, 345). The presence of

[3] Hyoid MNE=1 and sternum MNE=3.

some long bones in anatomical relationship suggests that articulated and fleshed regions of the body were transported for secondary deposition in the upper levels.

Deposition in the North bone pit is dated to the Tarxien phase, with the latter phase of its use corresponding with the peak of deposition in the hypogeum. It is tempting to suggest the pit could have remained open during the estimated 110–230 years of its use (Malone *et al.* 2019), but the dearth of weathering suggests remains were at least covered or overlain with soil while deposition was ongoing.[4] The disarticulated remains in this pit may represent clearance episodes from the hypogeum, which underwent extensive remodelling during this period, particularly in the Shrine area (Parkinson *et al.* forthcoming).

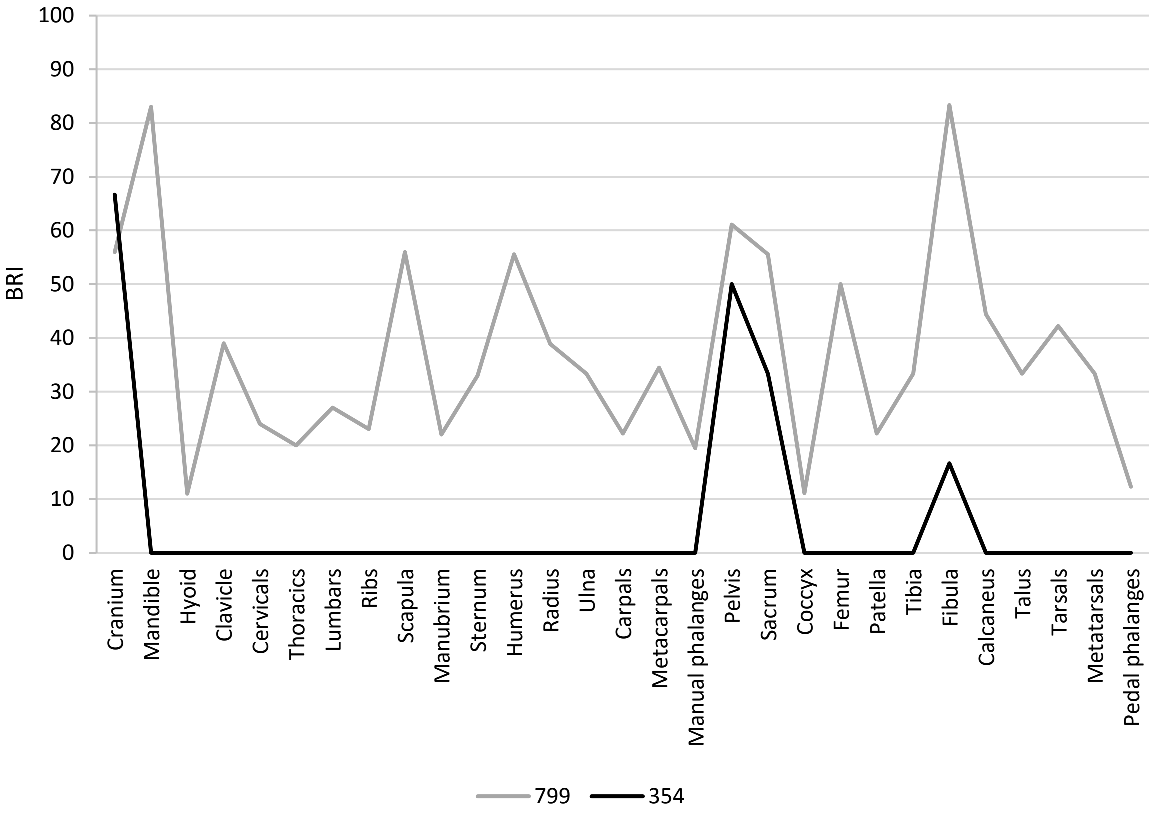


Figure 7.29: Skeletal element representation in (354) and (799) in the North bone pit.

7.3.9 Summary of the North bone pit

Most remains analysed from the North bone pit were highly fragmented and exhibited soil adhesion and concretion, in some cases obscuring observations of surface modification. Higher levels of fragmentation and poorer preservation were noted in (354). Many fragments in (354) were secured with primal or paraloid, and the bone was in poor, friable condition. In (799), there is more evidence of abrasion/erosion, alongside minimal weathering and insect damage.

[4] Weathering is much more likely to have occurred in the North bone pit than the hypogeum, as it is outside of the main hypogeum complex and therefore not protected by a cave roof.

There was no evidence of gnawing, burning or cutmarks. SER illustrates mixed practices of primary and secondary deposition in the lower levels, while in (354) more consistent practices of selective secondary deposition are attested, in some cases of body parts which remained in articulation.

Taphonomic feature	354	799
<5cm in size	88.4% (n=205)	75.8% (n=1566)
<1/2 complete	97.8% (n=227)	83.4% (n=1722)
<1/2 surface well preserved	95.7% (n=222)	74.3% (n=1535)
Abrasion/erosion	6.5% (n=15)	7.5% (n=155)
Weathering	0	0.3% (n=7)
Burning	0	0
Insect damage	0	0.1% (n=2)
Rodent gnawing	0	0
Cutmarks	0	0
MNI	7	9
Total analysed	232	2066

Table 7.3: Summary of taphonomic results from North bone pit contexts.

7.5 West Cave

West Cave contexts derive from three areas, all dating to the Tarxien phase. The 'Deep zone' marks the deepest area of excavation and unexcavated deposits still remain (Stoddart, Malone *et al.* 2009, 133–137). Dates from the lower fill (1307) place deposition from at least 2930–2870 cal BC (90% probability) in this area (Malone *et al.* 2019). In the Display zone, one blanket deposit (783) covered an area of approximately 4x4 m, containing a substantial number of artefacts and figurines (Stoddart, Malone *et al.* 2009, 159–163). This area was in use during peak deposition, from 2585–2520 cal BC (93% probability) for 130–265 years (95% probability) (Malone *et al.* 2019). In the Shrine, a sequence of deposits was analysed to examine depositional trends throughout a period when this area was extensively remodelled. (1206), in the lower levels, dates from 2895–2855 cal BC (74% probability) to 2555–2490 cal BC (95% probability), while the large deposit in the upper levels (960) marks a transitional phase just before the decline of the site's use at 2530–2475 cal BC (95% probability) (Malone *et al.* 2019).

7.5.1 Deep zone: (951), (1144), (1307)

Three contexts from the Deep zone sequence were sampled: (951), a 30 cm deep deposit covering the lower levels, which included (1144), a large pink deposit, and (1307) the lowest excavated fill in this area (Table 7.4). Within context (951), due to the lack of levels recorded on most bags, remains were analysed from most grid squares in an effort to collect data from a representative sample. All remains which could be located from (1144) were analysed, and almost 60% of (1307) was studied.

7.5.1.1 Completeness, preservation and fragment size

High fragmentation was observed across each context, with most representing <25% of the element (Figure 7.30). Overall, the mean API for the Deep zone is 1.43 (std. dev. 1.094). Fractionally more bones were almost, or fully, complete in (1144). Distinct patterns of bone preservation were evident (Figure 7.31). Somewhat consistent levels of preservation were observed in (951), although no bones were complete. Slightly better preservation was observed in (1144), where most fragments were 74–99% complete, and a few were 100% complete. In (1307), all fragments were either 50–74% or 74–99% complete. The mean QBI across all three contexts is 2.24 (std. dev. 1.310). Mean fragment size is 2.8 cm (std. dev. 2.270), and maximum fragment size is 261–270 mm (Figure 7.32).

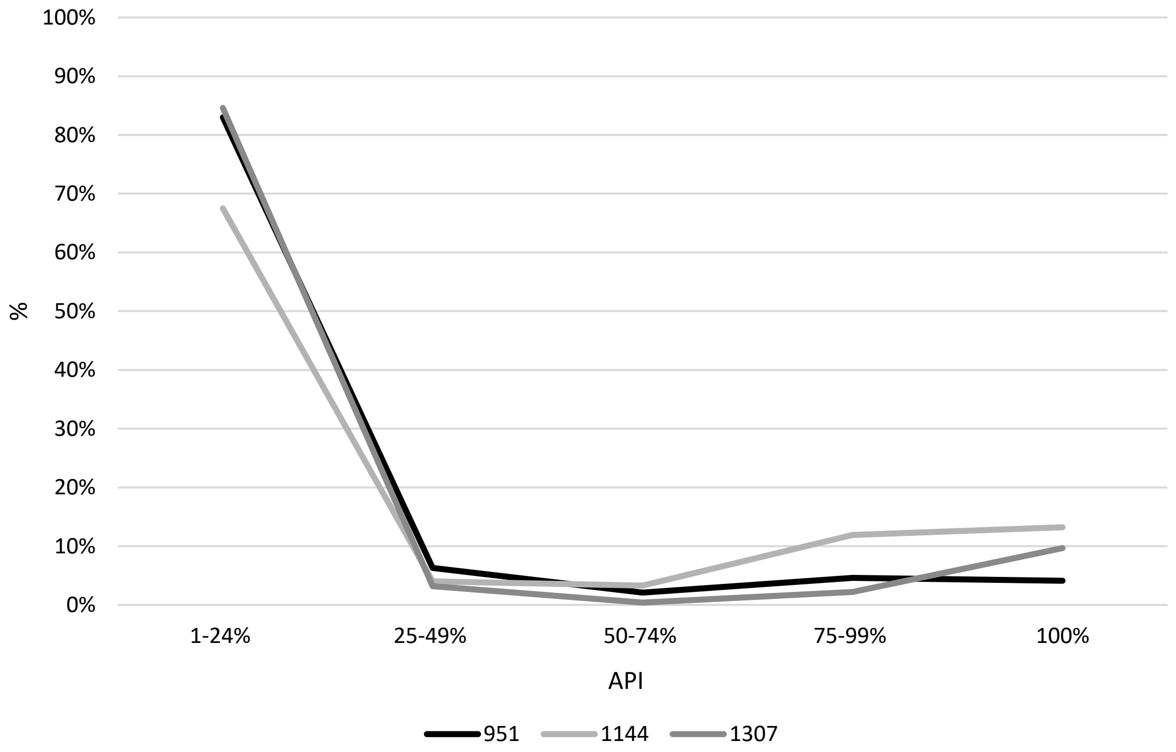


Figure 7.30: Bone completeness (API) in Deep zone contexts.

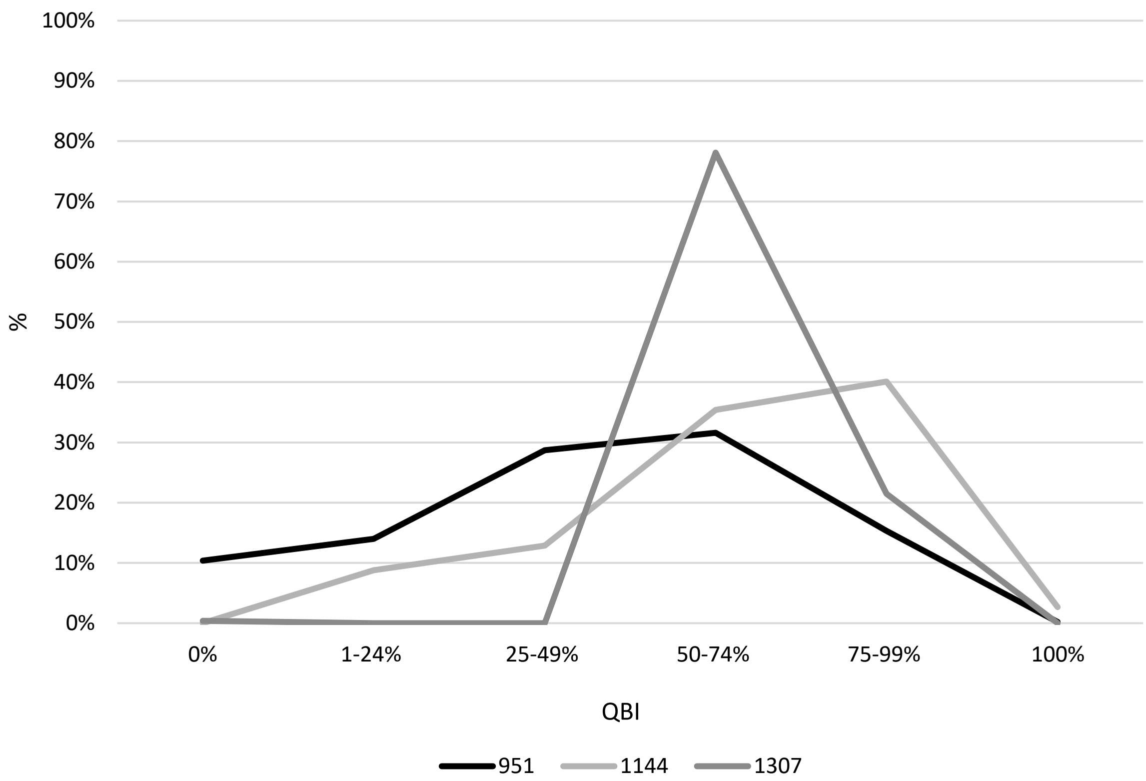


Figure 7.31: Bone preservation (QBI) in Deep zone contexts.

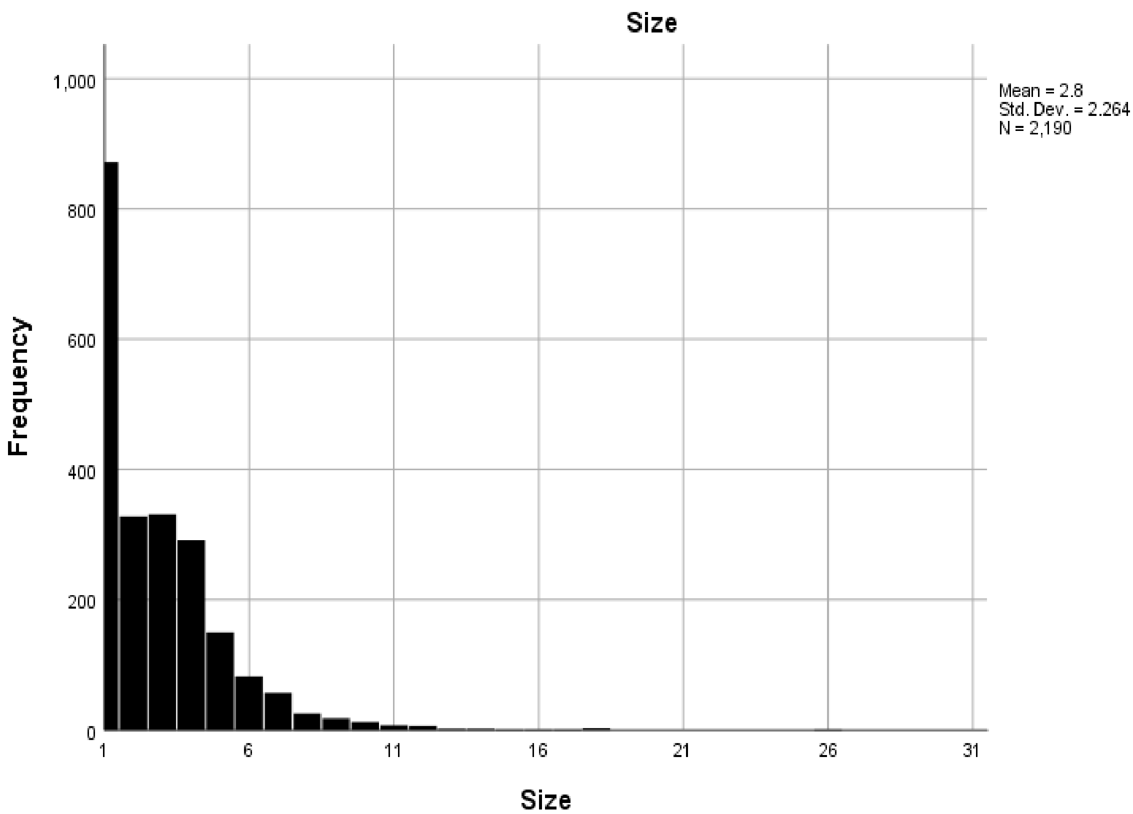


Figure 7.32: Fragment size distribution in Deep zone contexts.

7.5.1.2 Fracture morphology

No long bones were recorded in the (1307) sample. Total FFI from both (951) and (1144) is 5.8 (std. dev. 0.926), demonstrating dry bone fragmentation (Figure 7.33). Three fragments from (951) exhibited fresh bone breakage: two juvenile femoral fragments and one adult humerus. Excavation damage was noted on 37 fragments (1.5%).

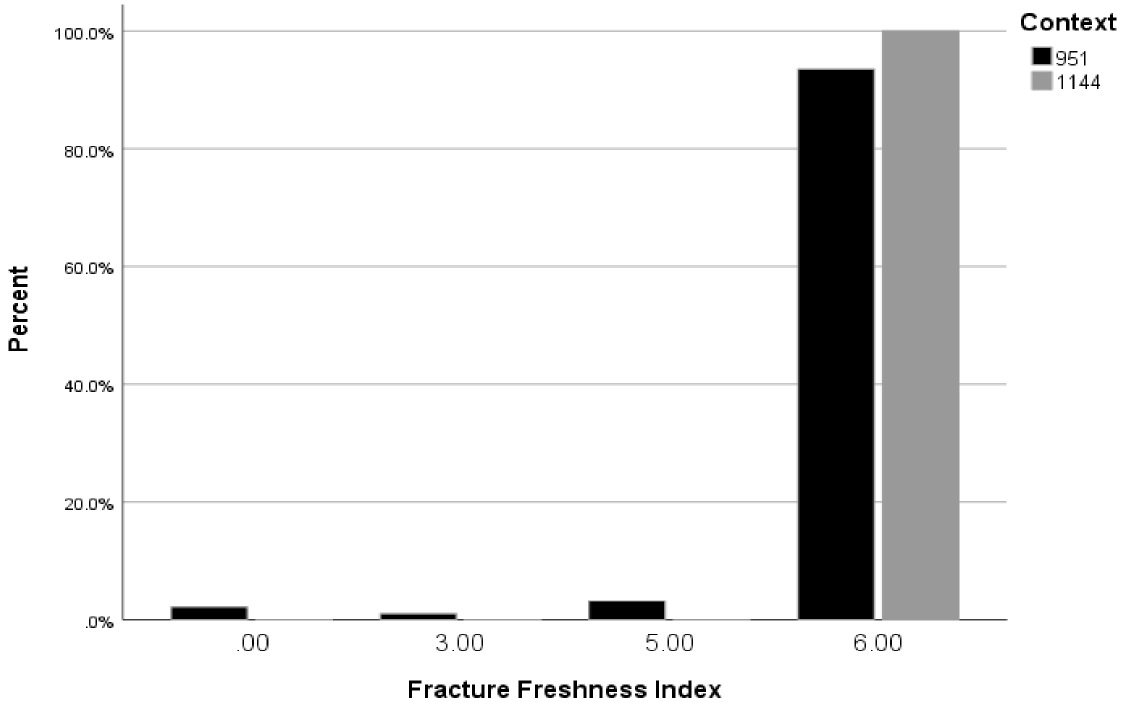


Figure 7.33: Total FFI recorded for long bone fragments in Deep zone contexts.

7.5.1.3 Weathering

Minimal weathering was observed across all three contexts, with a mean score of 0.22 (std. dev. 0.583). Only the initial stages were present, in the form of cortical flaking, delamination (Figure 7.34) and cracking, and most weathering was seen in context (951) (Figure 7.35). Skull elements or long bones were especially affected. Only a small number of elements of the pectoral and pelvic girdles and extremities displayed cortical flaking (Figure 7.36). The low prevalence and extent of these modifications cautions against processes of exposure to the elements and they may be more likely attributed to occasional inundation alongside humidity.

Figure 7.34: Delamination on long bone fragment from (951); scale: 1 cm (photo by author).

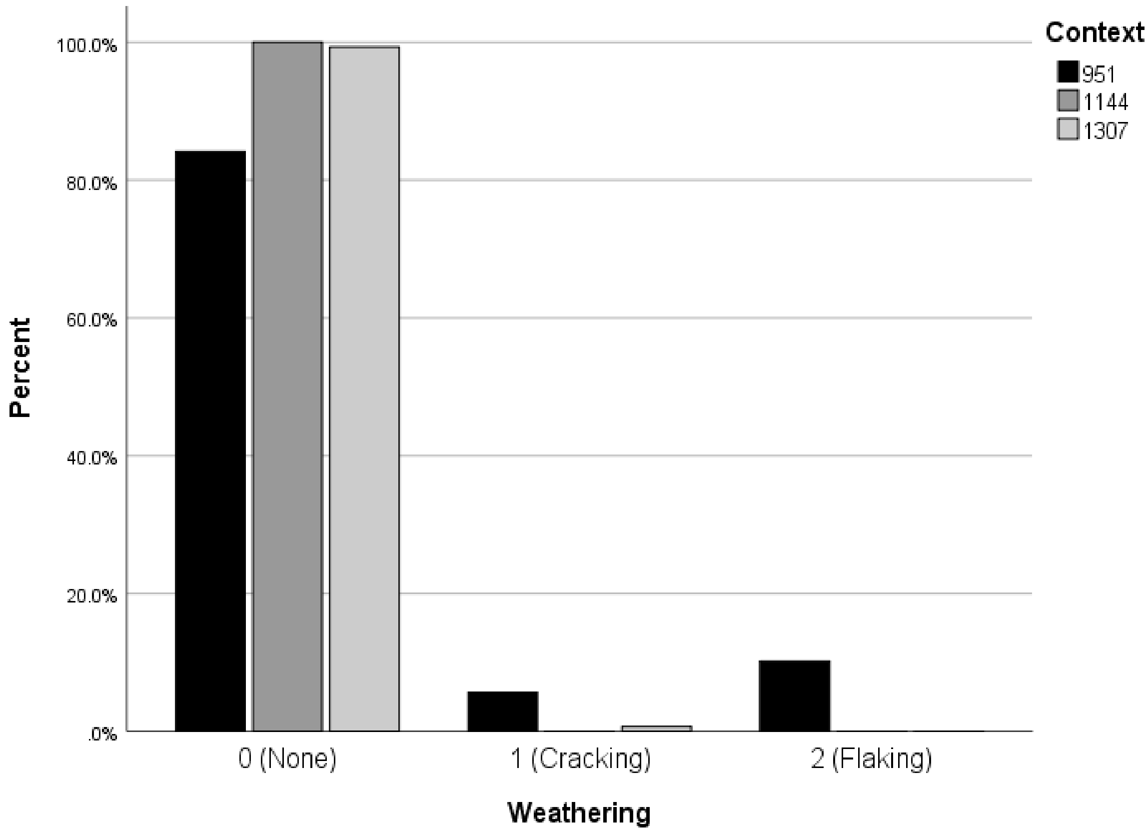


Figure 7.35: Weathering in Deep zone contexts.

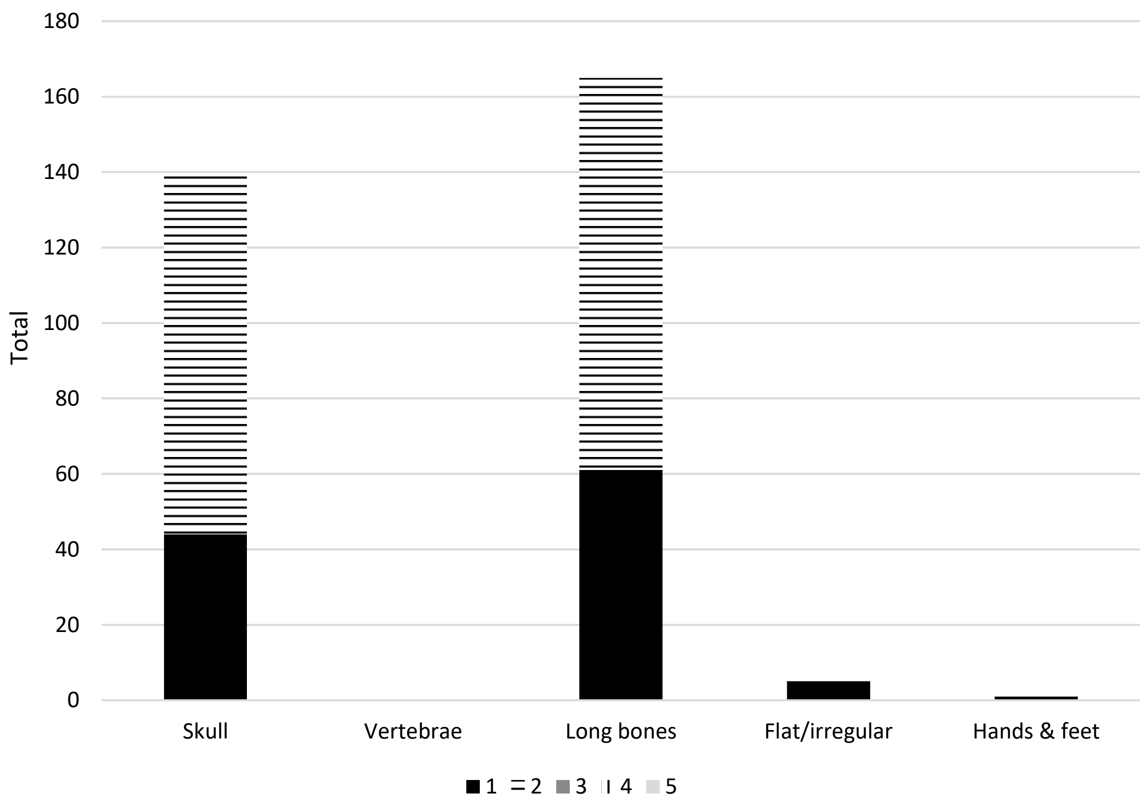


Figure 7.36: Weathering scores divided by bone type in the Deep zone contexts.

7.5.1.4. Abrasion and erosion

Abrasion and erosion were observed on 19.4% of the sample. The mean score across all three contexts is 0.08 (std. dev. 0.356), though the full range of scores were observed (Figure 7.37). All elements exhibited abrasion and erosion; long bones were the most commonly abraded, though flat/irregular elements displayed the most extensive abrasion (Figure 7.38).

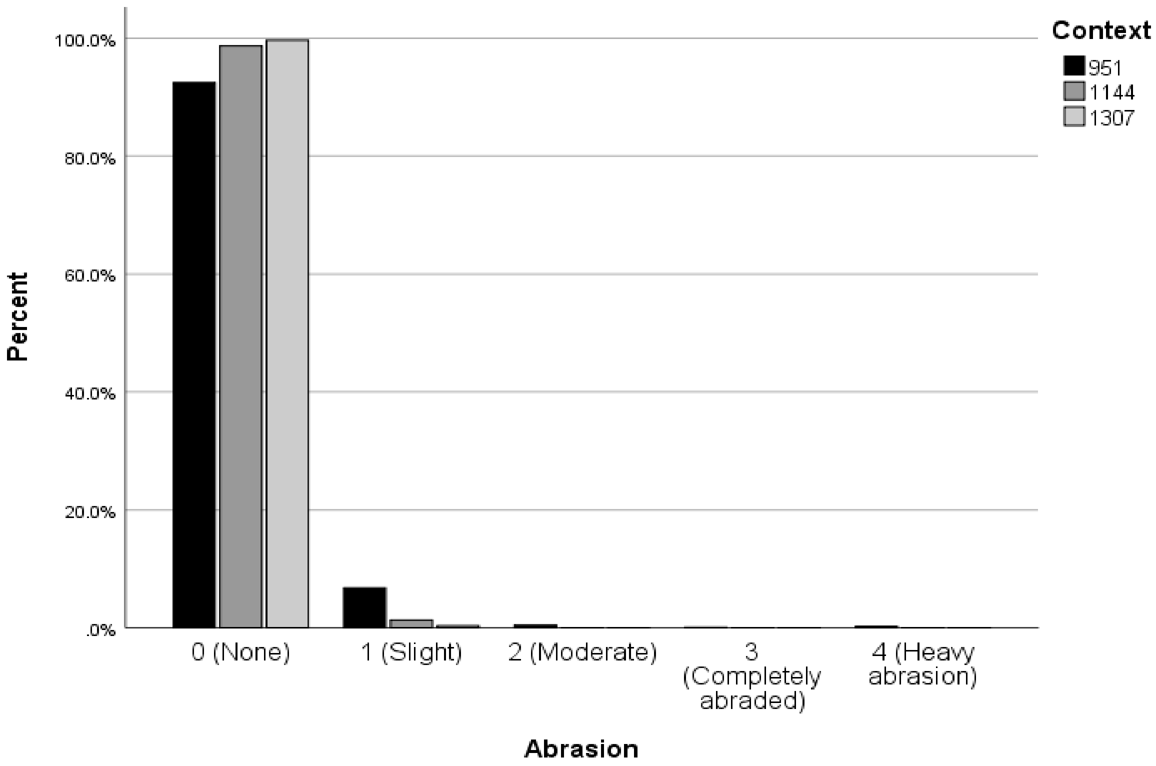


Figure 7.37: Total scores for abrasion and erosion in Deep zone contexts.

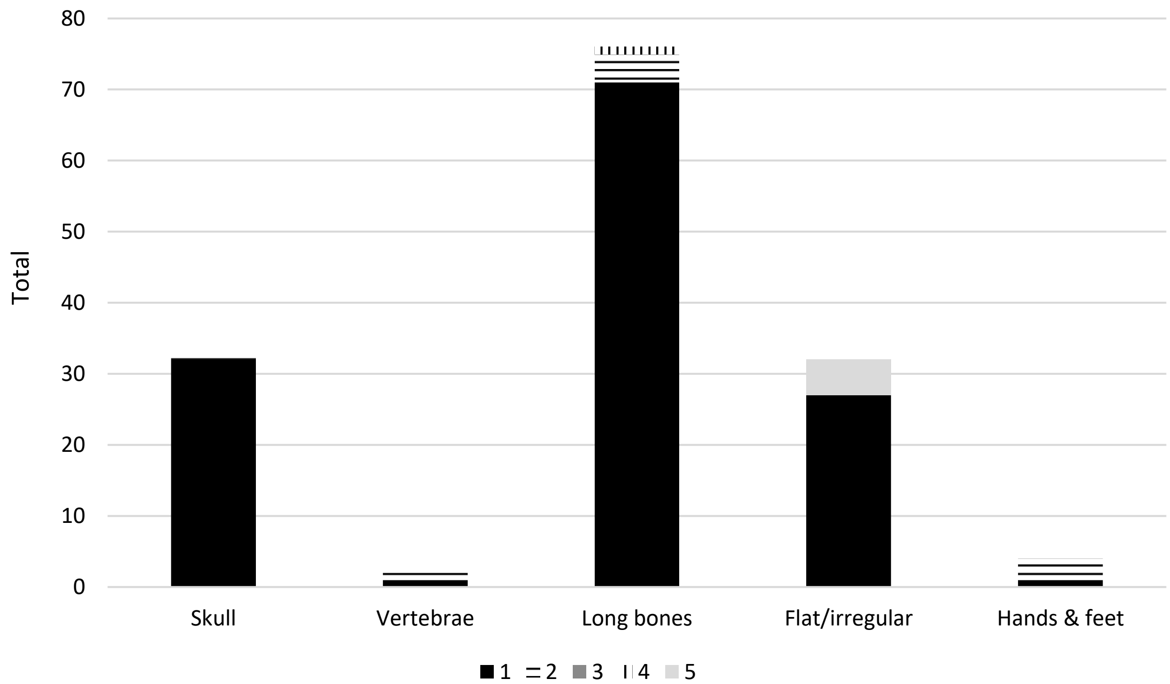


Figure 7.38: Abrasion and erosion scores divided by bone type in Deep zone contexts.

7.5.1.5 Discolouration

Discolouration and staining were observed on 4.4% of the sample. Only 5 fragments exhibited ochre staining. Most staining presented as areas of ‘bloom’ or linear/dendritic staining of various colours, including green (Figure 7.39), blue, brown, purple and black, attributed to plant roots, fungi or minerals in the surrounding sediment. No burning was observed.

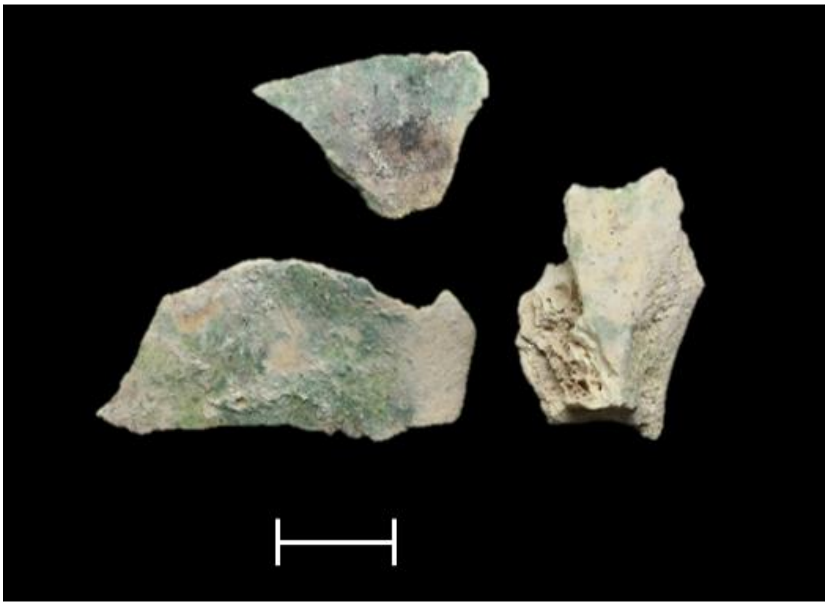


Figure 7.39: Green organic staining on three small fragments from (951); scale: 1 cm (photo by author).

7.5.1.6 Articulation

Articulation within the Deep zone was assessed through excavation plans, notebooks and photographs. (951) presented as a deep fill which was extremely densely packed with bone; as a result, bones were friable and fragmentary. There appear to have been minimal articulations preserved in (951), which was predominantly filled with long bones (Figure 7.40) and cranial caches (Figure 7.41). Deposits were markedly denser and slightly less fragmentary surrounding the megaliths. Observations during excavation note discrete clusters of similar elements, indicating secondary deposition and careful placement. In (1307), however, excavation plans record an articulated region of thoracic vertebrae and ribs, as well as ulnae and radii in close association.

Figure 7.40: Dense areas of bone between megaliths in the Deep zone, long bones are especially visible (photo from BRX archive).

Figure 7.41: Crania next to megaliths in (951) (photo from BRX archive).

7.5.1.7 Skeletal element representation

Element representation is distinct in each context (Figure 7.42). In the sample analysed from (1307), only crania and mandibles are present, representing 100% of the MNI (n=2). In the full context, a high number of arm bones were noted (Stoddart, Malone *et al.* 2009, 136), and this deposit appears to have contained both primary and secondary depositions. The sample from (1144) reveals many skeletal elements to be either absent or highly under-represented. The mandible, hyoid, clavicle, sternum, humerus, radius, patella and talus are all absent, suggesting both natural taphonomic decay and cultural selection. The representation of long bones and elements of the axial skeleton is low, accounting for 25% of the MNI, while the pelvis is over-represented. In part, this may be due to the small sample studied (although it represents all remains which could be located). Nevertheless, the over-representation of the pelvic girdle is unexpected. This pattern suggests selective removal from primary interments, including the long bones and mandibles, leaving the axial skeleton and pelvic girdle. This context was not fully excavated, although observations of the remains *in situ* indicated this area contained articulated individuals (C. Malone pers. comm.).

In the upper levels, crania are over-represented in (951) and all other elements (except for mandibles) represent <30% of the BRI. There are few small bones, with only some metacarpals, metatarsals and pedal phalanges present, although patellae are better-represented. During excavation, the structured nature of secondary deposition in (951) was clear, with clusters of crania lacking mandibles, as well as caches of loose teeth (Stoddart, Malone *et al.* 2009, 137). This suggests that the emphasis on patellae could be a result of such practices of clustering distinctive elements. The composition of elements in (951) does not rule out the possibility of some primary interments, as small bones are present—however, these are markedly less well-represented. Furthermore, the absence of the atlas bone (C1) in this sample emphasises the secondary nature of cranial deposits. Contextual data indicate that (951) was formed through clearance episodes in which remains from across the hypogeum were redistributed (Stoddart, Malone *et al.* 2009, 137). SER demonstrates changing depositional practices in this area which is perhaps unsurprising given its long duration of use and later remodelling through the insertion of megaliths (Malone *et al.* 2019).

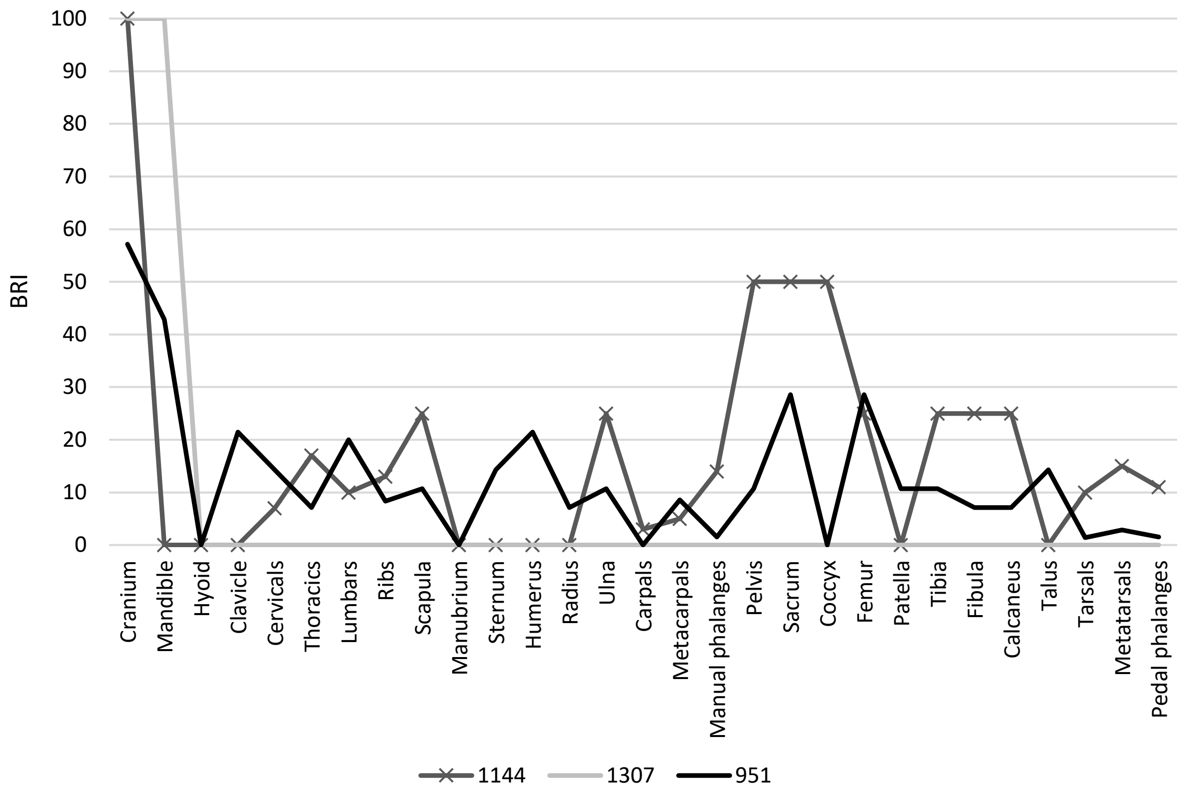


Figure 7.42: Skeletal element representation in (951), (1144), (1307) from the Deep zone.

7.5.1.8 Summary of the Deep zone

High fragmentation was encountered in all contexts (Table 7.4) although cortical surface preservation was fair to good. Abrasion, erosion and weathering were low in (951), and almost non-existent in (1144) and (1307). There was no evidence of animal damage, burning or cutmarks. SER demonstrates changing use of this area over time, with a mixed pattern of primary and secondary deposition in the lower levels, while the upper level (951) formed over a prolonged period of clearance episodes. However, these deposits were often carefully structured and placed, with caches of similar elements clearly observed during excavation.

Taphonomic feature	**951**	**1144**	**1307**
<5cm in size	74.7% (n=1437)	78.7% (n=119)	84.2% (n=234)
<1/2 complete	89.0% (n=1712)	71.5% (n=108)	87.8% (n=244)
<1/2 surface well preserved	48.5% (n=932)	21.2% (n=32)	0.4% (n=1)
Abrasion/erosion	7.6% (n=147)	1.4% (n=2)	0.4% (n=1)
Weathering	16.1% (n=310)	0	0.8% (n=2)
Burning	0	0	0
Insect damage	0	0	0
Rodent gnawing	0	0	0
Cutmarks	0	0	0
MNI	7	2	2
Total analysed	1923	151	278

Table 7.4: Summary of taphonomic results from deep zone contexts.

7.5.2 Display zone: (783)

The sample analysed from (783) traverses five 1x1 m grids, all excavation seasons, and a range of levels.

7.5.2.1 Completeness, preservation and fragment size

60% of the sample from (783) represented fragments <25% complete and only 10% of the analysed bones were complete (Figure 7.43). Mean API is 1.93 (std. dev. 1.407). Bone preservation was favourable, distinguishing (783) from many other contexts analysed (Figure 7.44). 57% of the remains exhibited good preservation across 75–99% of the cortical surface, and the mean QBI is 3.35 (std. dev. 1.070). Mean fragment size is 2.74 cm (std. dev. 2.325), and maximum fragment size is 26.2 cm (Figure 7.45).

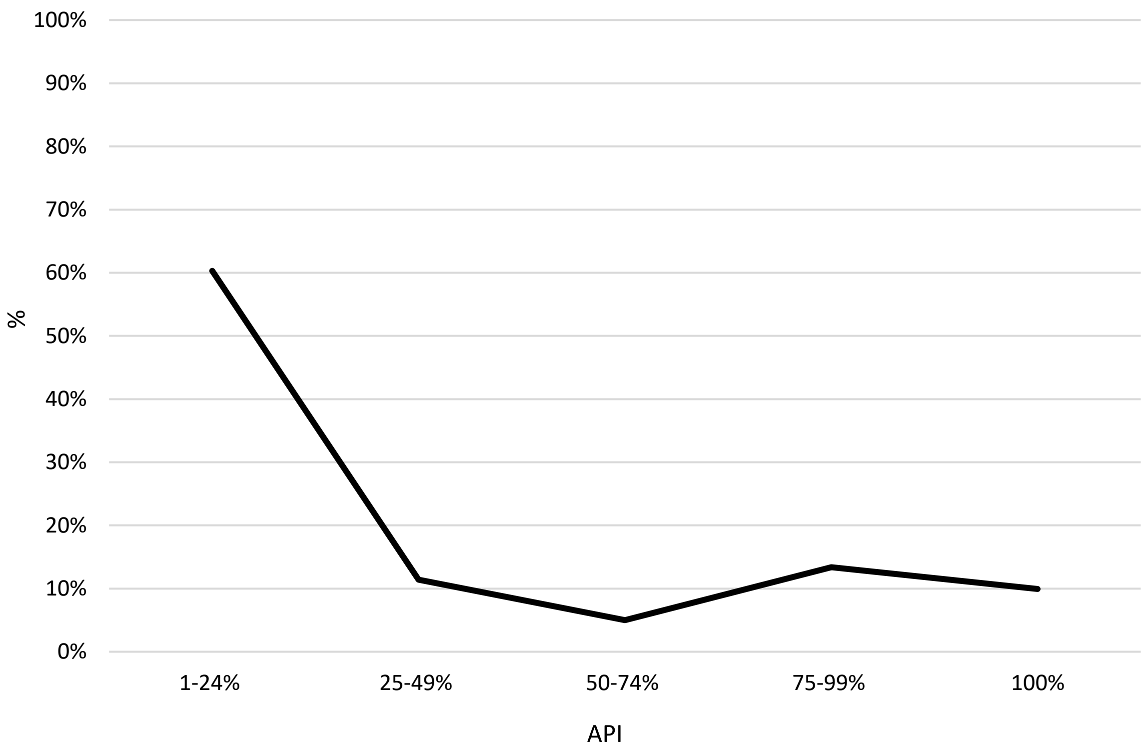


Figure 7.43: Bone completeness (API) in (783).

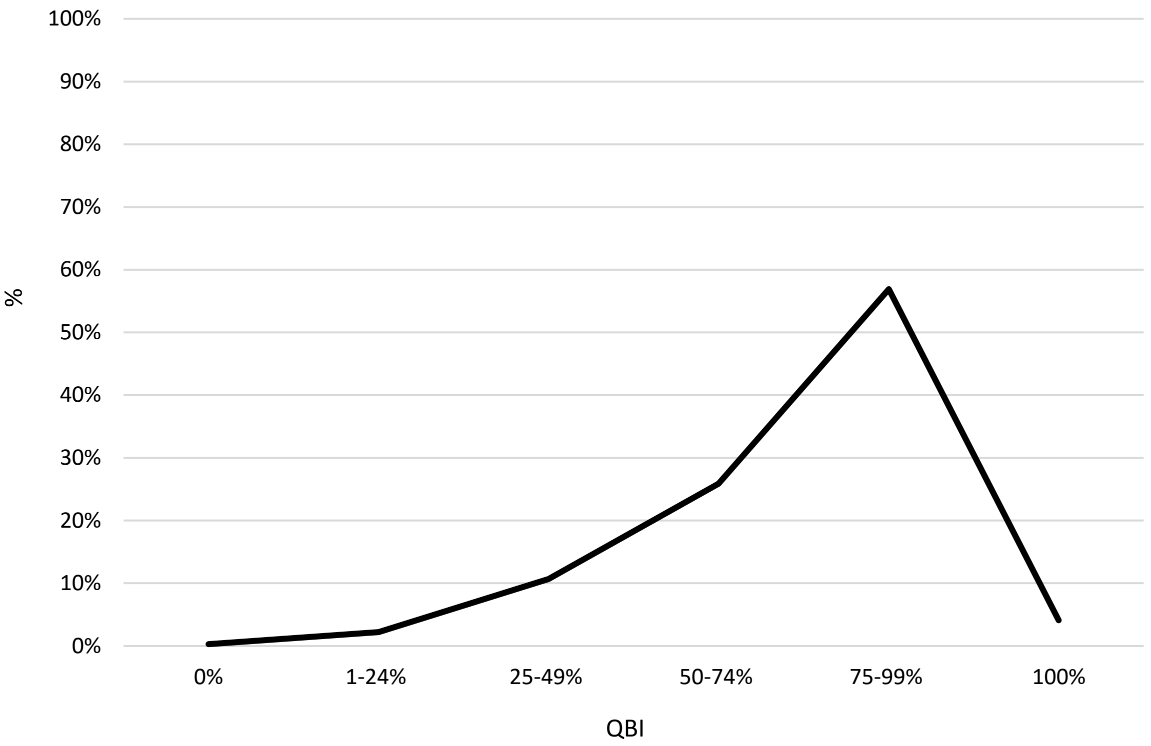


Figure 7.44: Bone preservation (QBI) in (783).

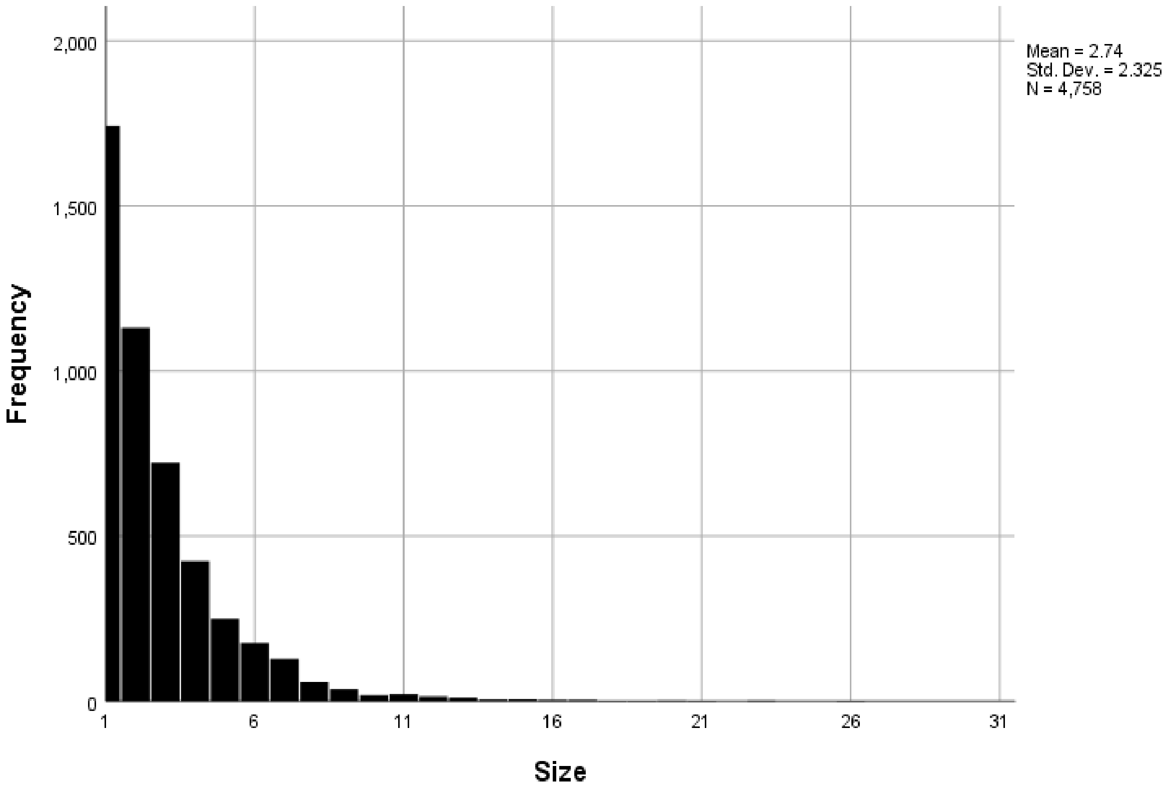


Figure 7.45: Fragment size distribution in (783).

7.5.2.2 Fracture morphology

The mean FFI is 5.99 (std. dev. 0.054) demonstrating long bone fragmentation exclusively to dry bone (Figure 7.46). Excavation damage was observed on 212 fragments (4.3%).

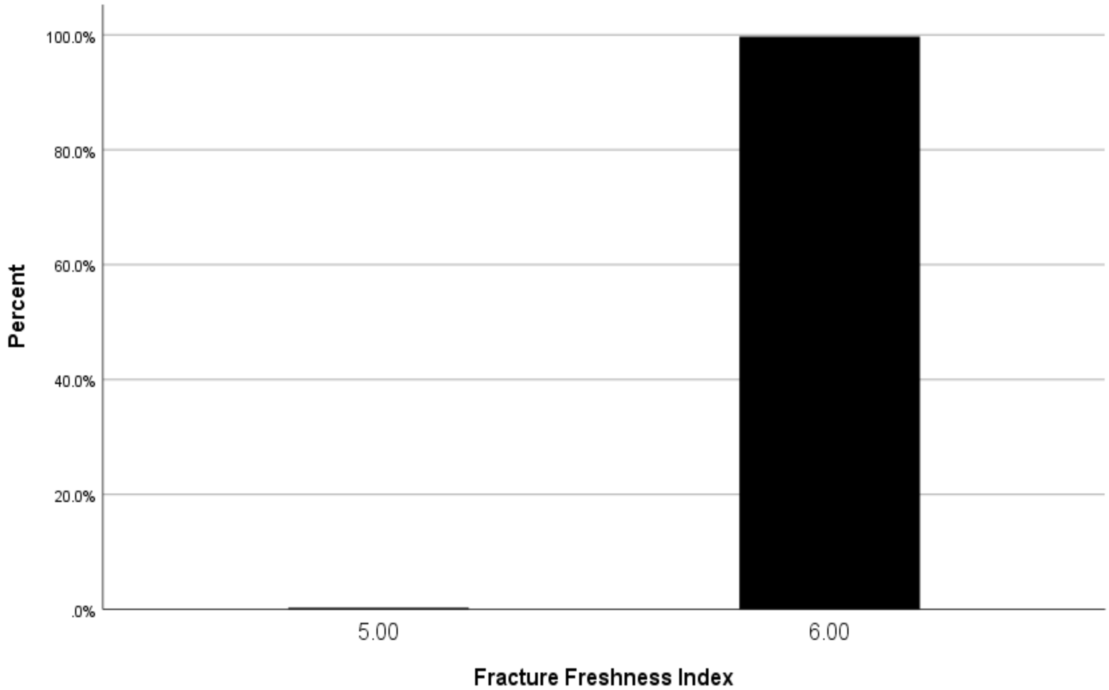


Figure 7.46: FFI scores from (783).

7.5.2.3. Weathering

Weathering was minimal, with a mean score of 0.04 (std. dev. 0.273) and cortical cracking and flaking observed on only 2.8% of the sample (Figure 7.47). Affected bones were distributed throughout (783) in a range of grid squares and levels. Cortical cracking and flaking were observed on most elements except vertebrae and were prevalent on crania and mandibles (73 fragments), followed by long bones (41 fragments) (Figure 7.48). Longitudinal cracks in some long bones were notably warped, likely due to contraction and expansion, consistent with periodic inundation or flooding of the deposits as a result of seasonal rainfall.

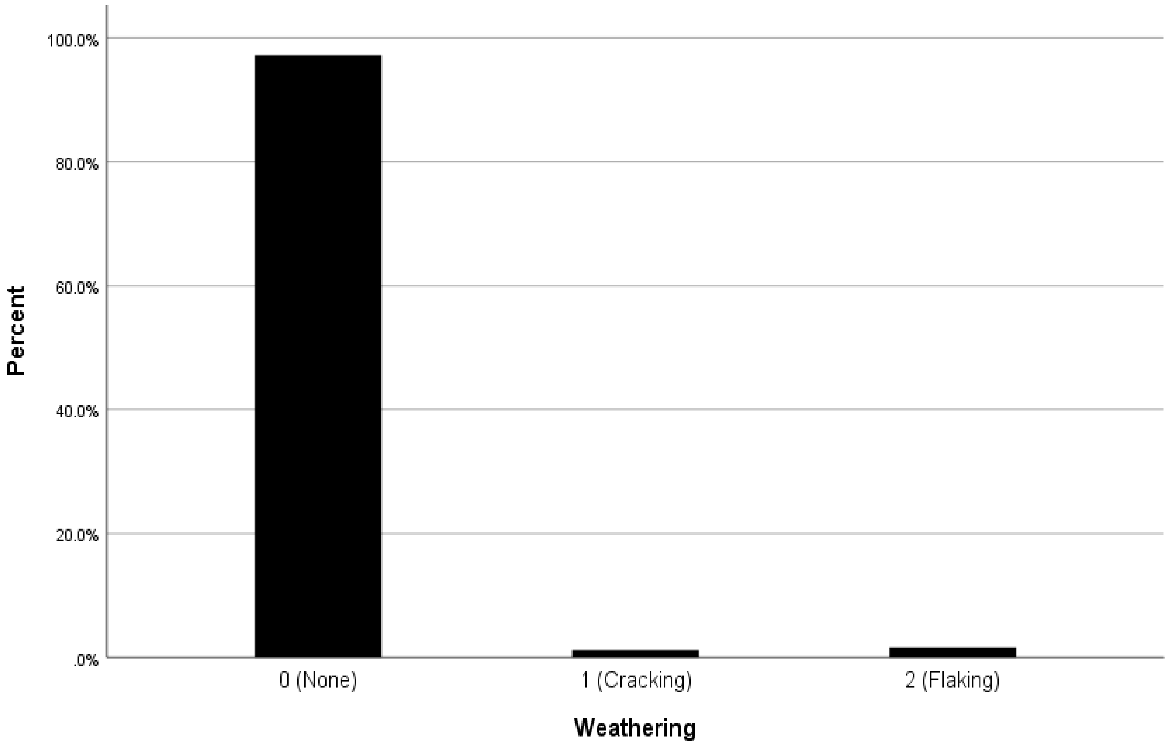


Figure 7.47: Weathering in (783).

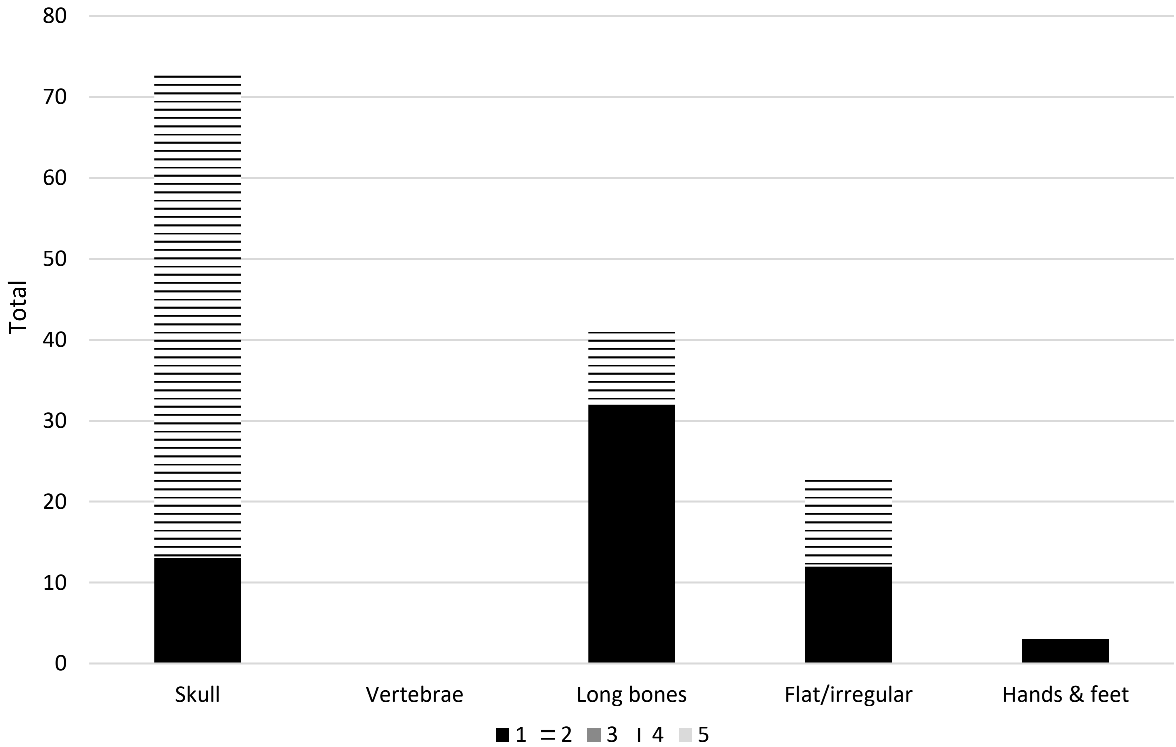


Figure 7.48: Weathering scores divided by bone type in (783).

7.5.2.4 Abrasion and erosion

Abrasion and erosion were present on 11.4% of the sample, mostly attributed to root etching (Figure 7.49). The mean score is 0.12 (std. dev. 0.352). All elements were affected by low levels of erosion (Figure 7.50).

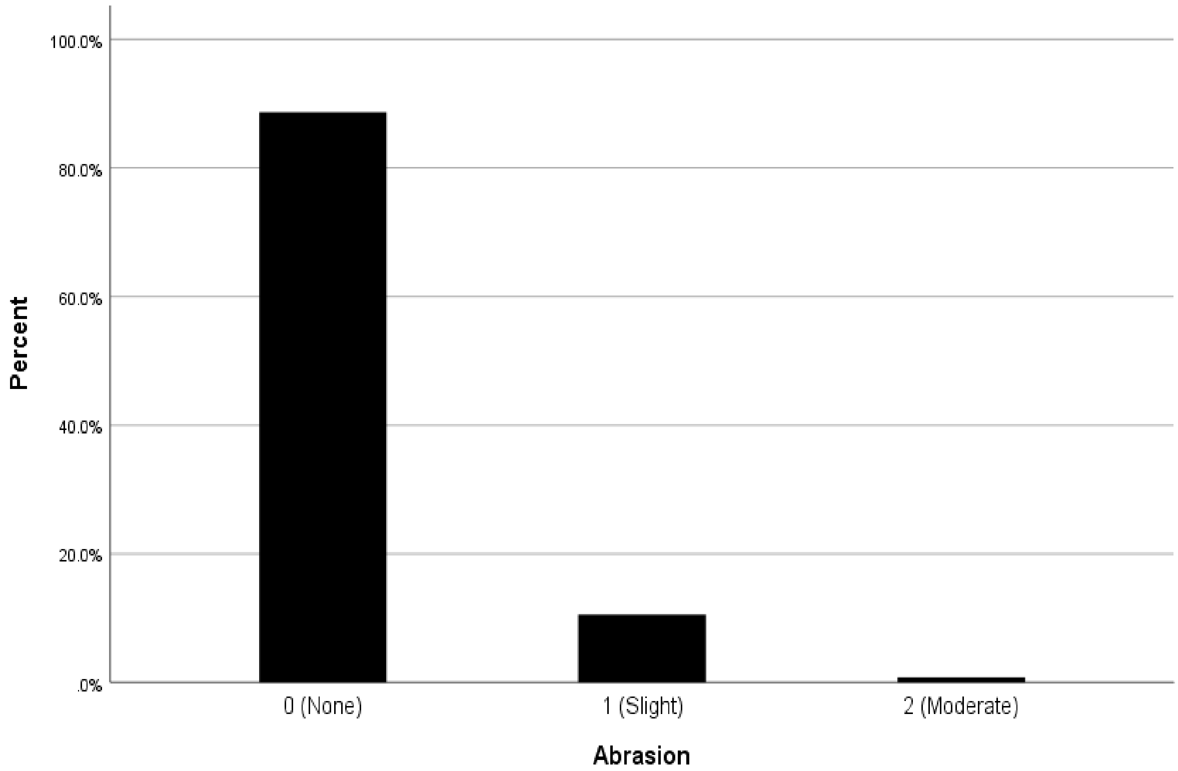


Figure 7.49: Abrasion and erosion scores in (783).

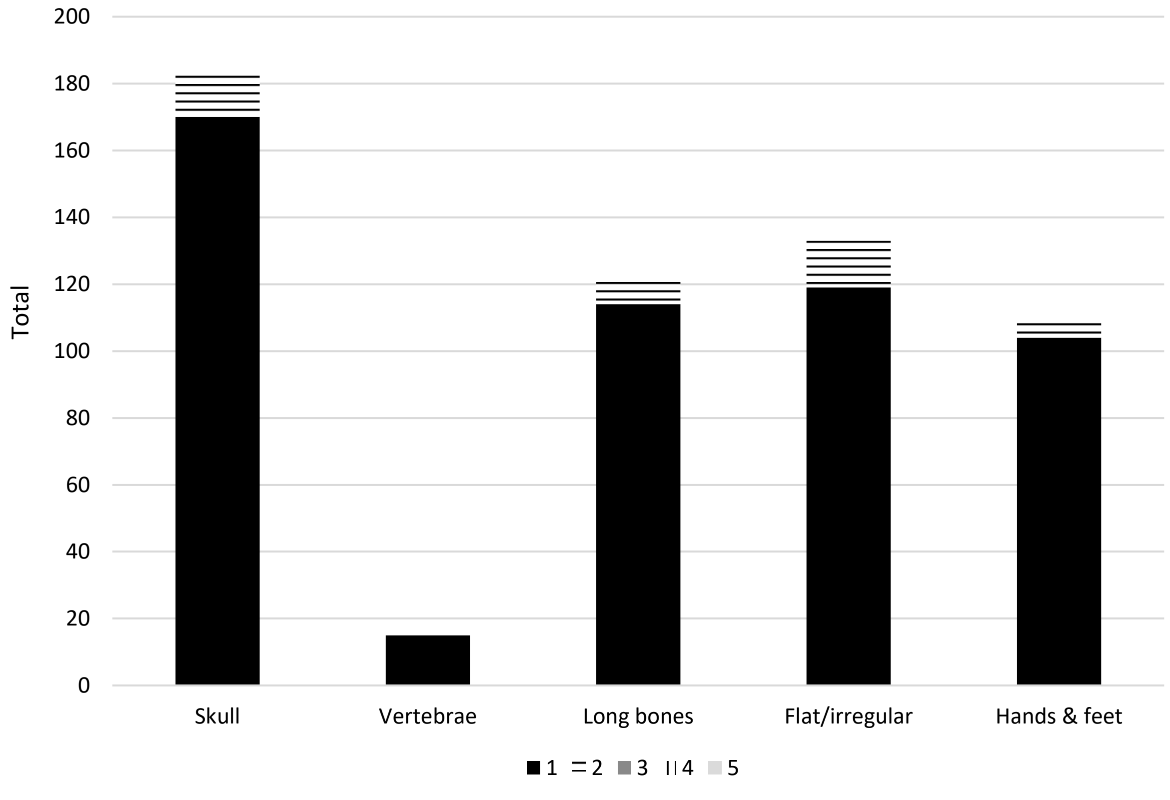


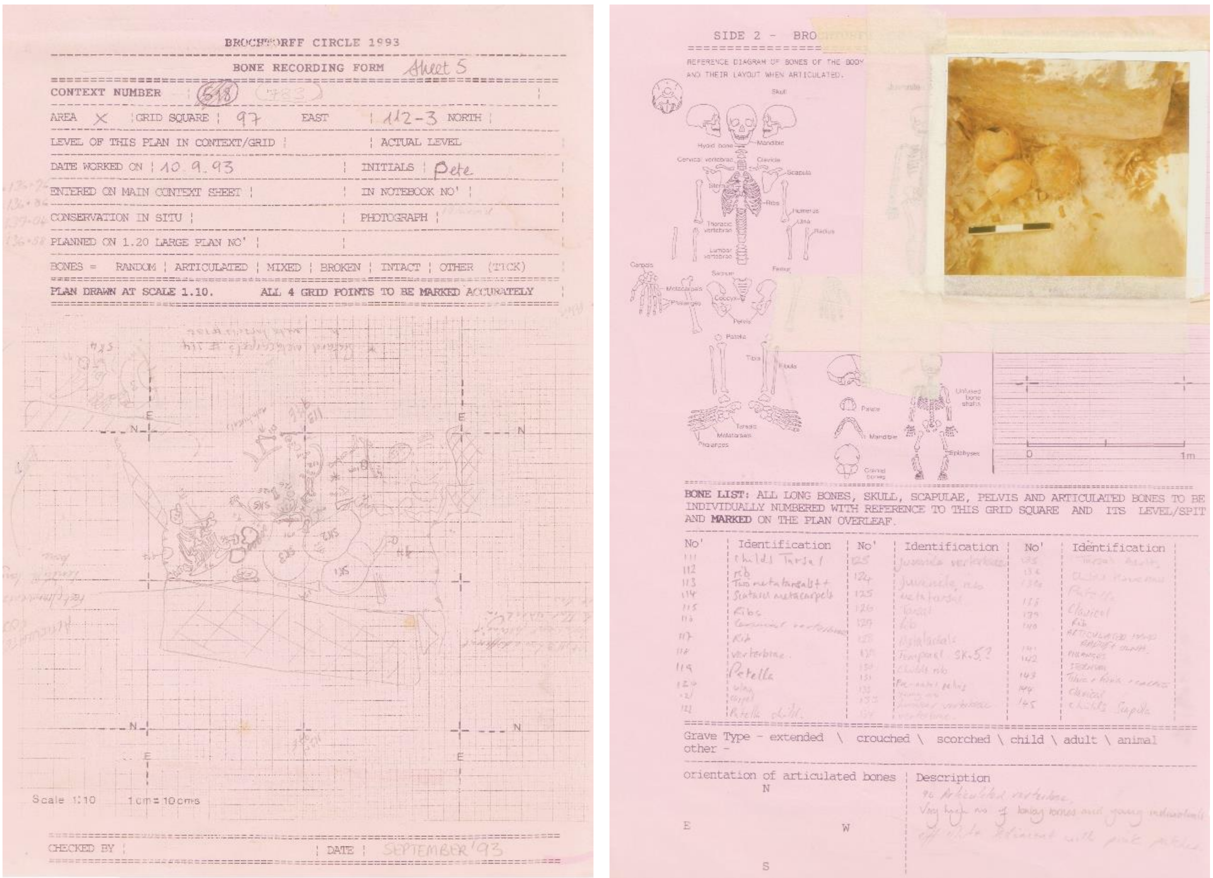
Figure 7.50: Abrasion and erosion scores divided by bone type in (783).

7.5.2.5 Discolouration and burning

Staining and discolouration was observed on 148 fragments (3%). Ochre had stained 36 fragments, mostly in the form of a light pink 'wash', likely due to powdered red ochre dispersed during inundation of the cave. A small number of elements presented soil staining and limestone concretion. The remainder presented patches of black, green and purple staining due to mineral and root action. Burning was observed on a child's phalanx, which displayed partial scorching of the diaphysis.

7.5.2.6 Articulation

Within (783), all remains which could be located from one grid square (97E/112N) were fully analysed to assess the sequence of deposition. Careful excavation in this area ensured that most bones were assigned a number which was cross-referenced on plan drawings (Figure 7.51) and finds bags, allowing taphonomic observations to refer to the spatial location of remains using the intra-site GIS. Additionally, several good quality photographs of this area are available.


BROCHTORFF CIRCLE 1993
BONE RECORDING FORM Sheet 5
CONTEXT NUMBER 618
AREA X | GRID SQUARE 97 | EAST 112-3 NORTH
LEVEL OF THIS PLAN IN CONTEXT/GRID | ACTUAL LEVEL
DATE WORKED ON 10.9.93 | INITIALS Pete
ENTERED ON MAIN CONTEXT SHEET | IN NOTEBOOK NO'
CONSERVATION IN SITU | PHOTOGRAPH
PLANNED ON 1.20 LARGE PLAN NO'
BONES = RANDOM | ARTICULATED | MIXED | BROKEN | INTACT | OTHER (TICK)
PLAN DRAWN AT SCALE 1.10. ALL 4 GRID POINTS TO BE MARKED ACCURATELY
Scale 1:10 1cm = 10cms
CHECKED BY | DATE SEPTEMBER '93

SIDE 2 - BRO
REFERENCE DIAGRAM OF BONES OF THE BODY AND THEIR LAYOUT WHEN ARTICULATED.
BONE LIST: ALL LONG BONES, SKULL, SCAPULAE, PELVIS AND ARTICULATED BONES TO BE INDIVIDUALLY NUMBERED WITH REFERENCE TO THIS GRID SQUARE AND ITS LEVEL/SPIT AND MARKED ON THE PLAN OVERLEAF.
No' | Identification | No' | Identification | No' | Identification
Grave Type - extended \ crouched \ scorched \ child \ adult \ animal other -
orientation of articulated bones | Description
N E W S

Figure 7.51: Recording form for 97E/112N with drawing on front (left) and detailed inventory of bones on the back (right) (BRX archive).

A total of 3,632 fragments were analysed, >80% of which comprised nonadult remains. This higher than expected representation of young individuals suggests this area may have been used predominantly for their interment. Elements of the axial skeleton, pectoral and pelvic girdles were well-represented (the pelvis represented 76% of the BRI and the scapula, 66%). Some articulating regions and bone pairs were observed (including a forearm and hand, radius and ulna, tibia and fibula), and their *in situ* location showed them to be articulated when excavated (Figure 7.52). The preserved articulations of a lower leg and foot, and forearm and hand, separated from the corresponding upper limbs, illustrates carefully timed acts of disarticulation. The patella forms a labile joint, and while the humero-ulnar joint is more robust, the affected individual is a child, and the joint would have been unstable—yet, as is evident in the photograph below, even the unfused proximal epiphysis of the radius was preserved. The disruption of these joints, without disturbing the labile articulations of the extremities, is strong evidence for intentional and careful manipulation.

Figure 7.52: Articulating regions and bone pairs from 97E/112N isolated in ArcGIS with an articulated lower arm and hand and lower leg and foot circled in red (left, map by author); articulated lower leg and foot photographed *in situ* (top right, from BRX archive); articulated lower arm and hand identified in the laboratory (bottom right, photo by author).

At the lowest levels, directly on the bedrock, an adolescent was deposited, flexed on their right side with the right arm extended alongside their body, and their left arm flexed across the chest. A chert scraper was placed at this level, posterior to the individual’s pelvis. In the overlying levels, three partial and semi-articulated axial skeletons are visible (Figure 7.53). The anatomical relationship of these labile joints indicates primary deposition; the removal of skulls (from two) and limbs (from all), leaving vertebrae and ribs in connection, demonstrates this to be a significant residual signature. Two of these axial skeletons indicate that individuals were placed on a similar axis as the basal inhumation. The third individual was placed on a north-south axis, with their head to the south, facing east.

There are two important implications of this finding: firstly, depositional sequences were not always initiated by the interment of adults; secondly, recurring incidences of similar depositional positions are observed throughout the hypogeum (e.g. the 'Shrine' sequence and Central pit: Stoddart, Malone *et al.* 2009, 121–122, 140–149). This area is high in nonadult remains, attesting to the parity in treatment across individuals of all ages. The repeated placement of individuals in a similar position evokes commemoration of the initial interment.

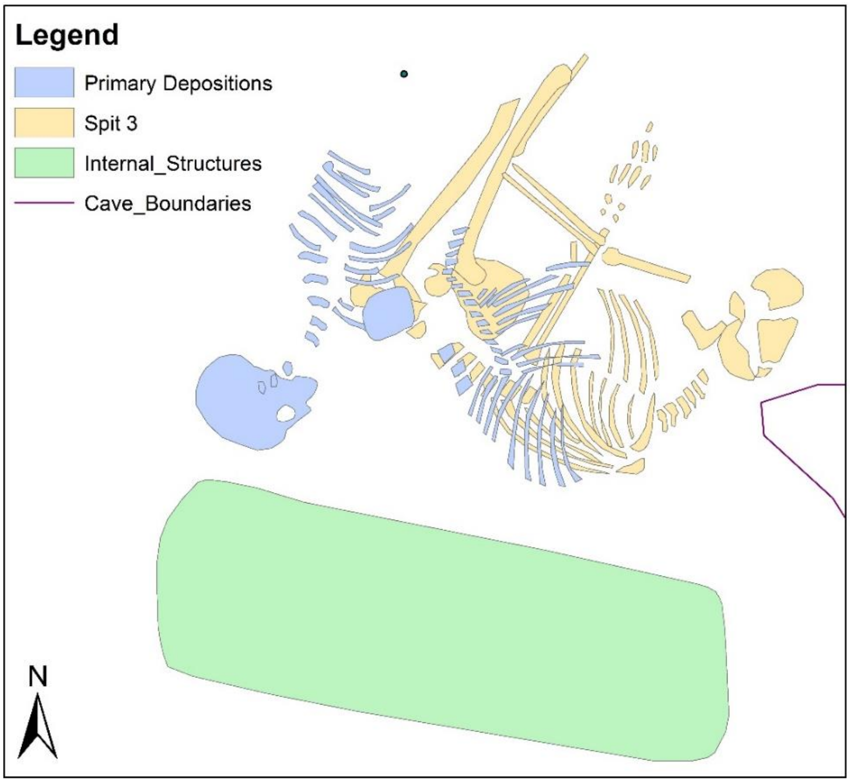


Figure 7.53: Remains of primary inhumations represented by axial skeletons (in blue), with two individuals in the same position as the individual in spit 3. Map by author.

7.5.2.7 Skeletal element representation

All elements are present in (783) although, except for crania and cervical vertebrae, they represent <40% of the MNI (Figure 7.54). The least represented elements are manubria, carpals and sacra (7–12%), but the sterna and hyoid show fair representation (18%) and manual phalanges and metatarsals are relatively well-preserved (31–33%). The low overall representation of most elements is likely a result of fragmentation due to overlying deposits. The over-representation of cervical vertebrae and generally good preservation of the axial skeleton accords with the suggestion that these elements represent a residual signature. Thus, although much of the deposit was disarticulated, element representation strongly indicates the dominant practice of primary interment, further supported by the analysis of 97E/112N, above.

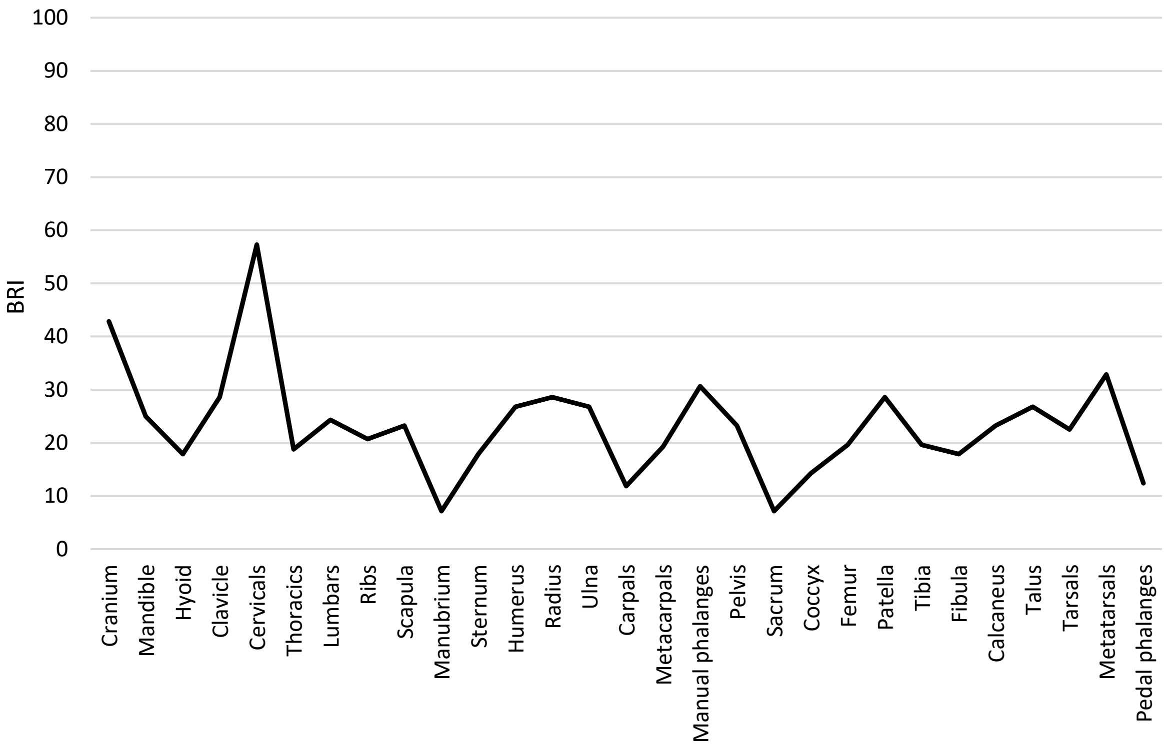


Figure 7.54: Skeletal element representation in (783).

7.5.2.8 Summary of the Display zone

Most remains were highly fragmented and <5cm in maximum length (Table 7.5). Despite this, bone preservation was good and evidence of abrasion, erosion, and weathering was minimal. Burning was present on one fragment. Animal damage and cutmarks were absent. Analysis of articulation and SER demonstrate the predominance of primary deposition in this area, and subsequent disarticulation was occasionally intentionally and carefully timed.

Taphonomic feature	**783**
<5cm in size	81.1% (n=4019)
<1/2 complete	71.7% (n=3554)
<1/2 surface well preserved	12.6% (n=625)
Abrasion/ erosion	11.4% (n=563)
Weathering	2.8% (n=140)
Insect damage	0
Burning	0.02% (n=1)
Rodent gnawing	0
Cutmarks	0
MNI	28
Total analysed	4953

Table 7.5: Summary of taphonomic results from (783).

7.5.3 Shrine: (960), (1024), (1206)

Three contexts from the Shrine sequence were sampled: (1024) an ochred fill covering (960) and (783), (960), a large pink silt loam deposit in the upper levels, and (1206) a pink silt deposit in the lower levels. Remains from a range of grid squares and levels were analysed in (960), reaching a total of 25.6% of the context. All remains which could be located from (1024) were analysed. In (1206), 11.3% of the context was sampled, mostly pertaining to nonadult individuals which were deposited in semi-articulation.

7.5.3.1 Completeness, preservation and fragment size

High fragmentation was observed across each context, with most fragments representing <25% of the element, although slightly better preservation was evident in (960) and (1206) where around 10% of the elements in each were complete (Figure 7.55). Overall, the mean API for the sample from the Shrine is 2.03 (std. dev. 1.463). Bone preservation was similar in both (960) and (1206), with most cortical surfaces well-preserved, while preservation was slightly lower in (1024) (Figure 7.56). The mean QBI across all three contexts is 3.36 (std. dev. 1.0698). Mean fragment size is 2.78 cm (std. dev. 2.738) and maximum fragment length is 31.9 cm (Figure 7.57).

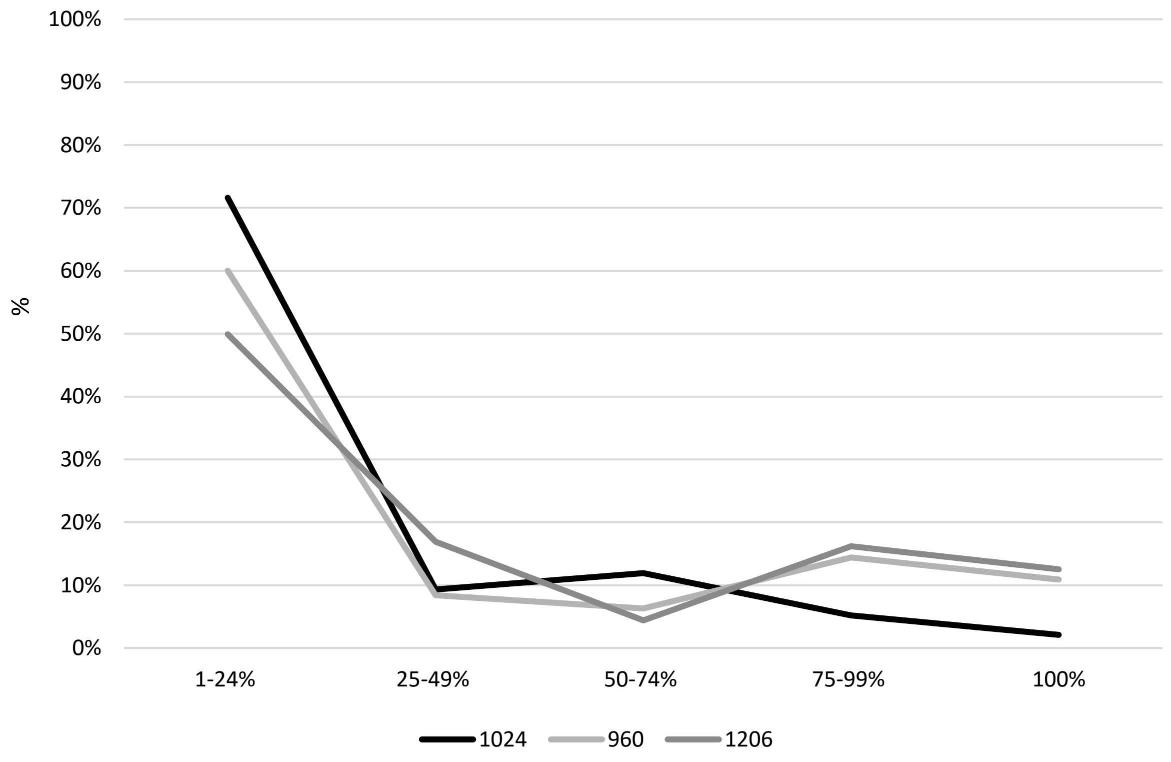


Figure 7.55: Bone completeness (API) in Shrine contexts.

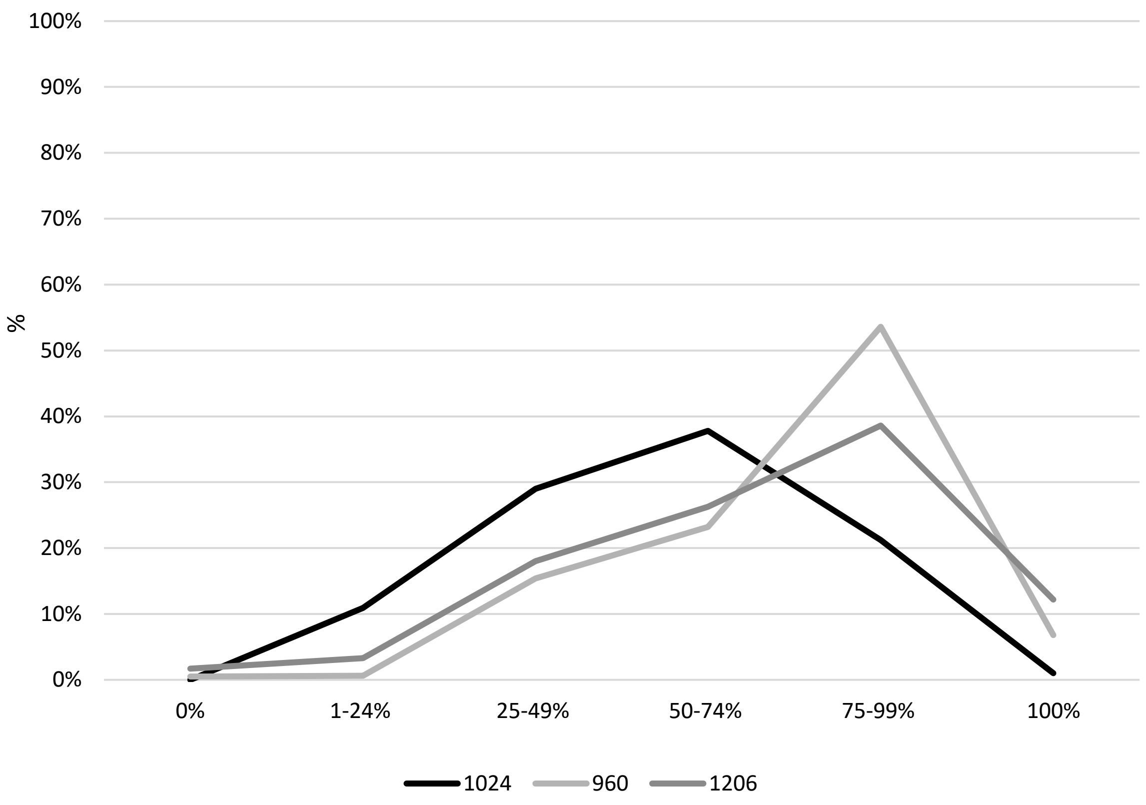


Figure 7.56: Bone preservation (QBI) in Shrine contexts.

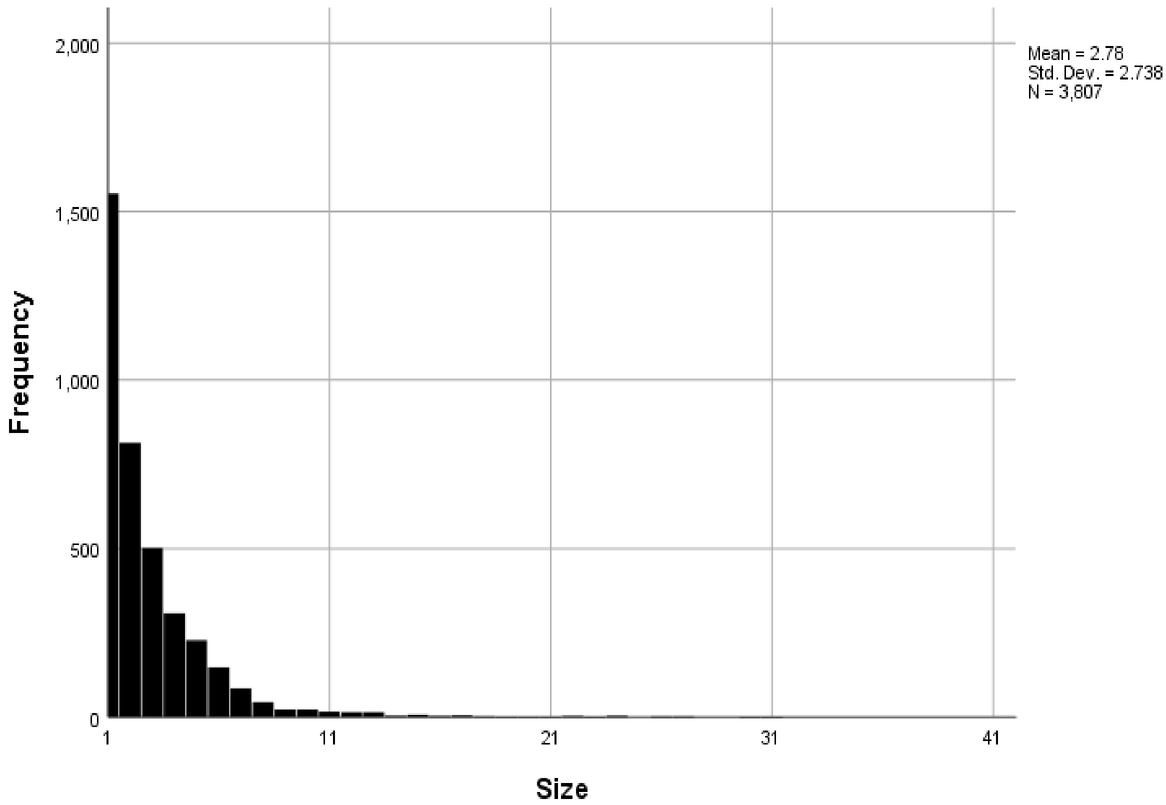


Figure 7.57: Fragment size in Shrine contexts.

7.5.3.2 Fracture morphology

The mean FFI across the Shrine sample is 5.97 (std. dev. 0.539) (Figure 7.58), demonstrating breakage to dry bone. In (1206), a helical fracture was observed on a nonadult femur, representing fragmentation of fresh bone during the peri-mortem interval.

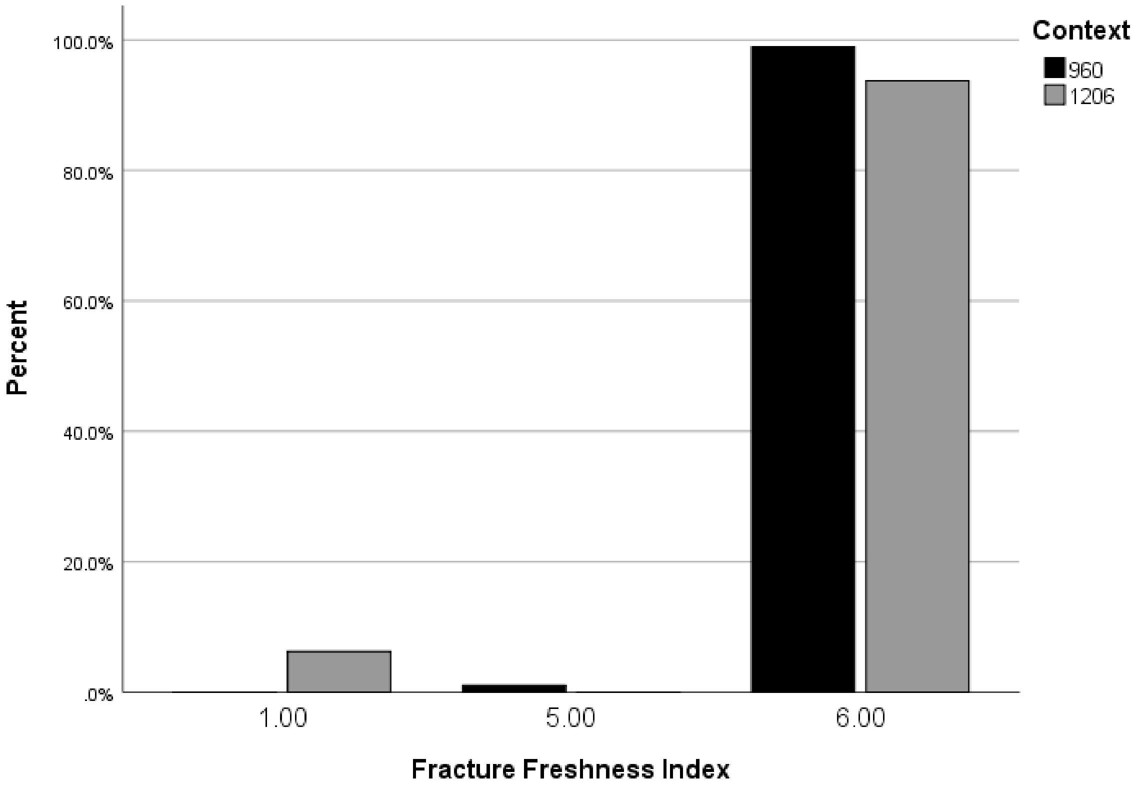


Figure 7.58: Total FFI recorded for long bone fragments in Shrine contexts.

7.5.3.3 Weathering

Minimal weathering was observed in (960) and (1206) (Figure 7.59). Overall, the mean weathering score is 0.03 (std. dev. 0.241). Some cortical cracking is attributed to compression fractures due to the weight of overlying deposits, and warping was observed on a few fragments. Similar numbers of skull fragments, long bones and hand and feet bones were weathered in (960) (Figure 7.60). In (1206), nearly double the number of skull fragments to long bones were affected, although weathering was more extensive on long bones and hand and feet bones (Figure 7.61).

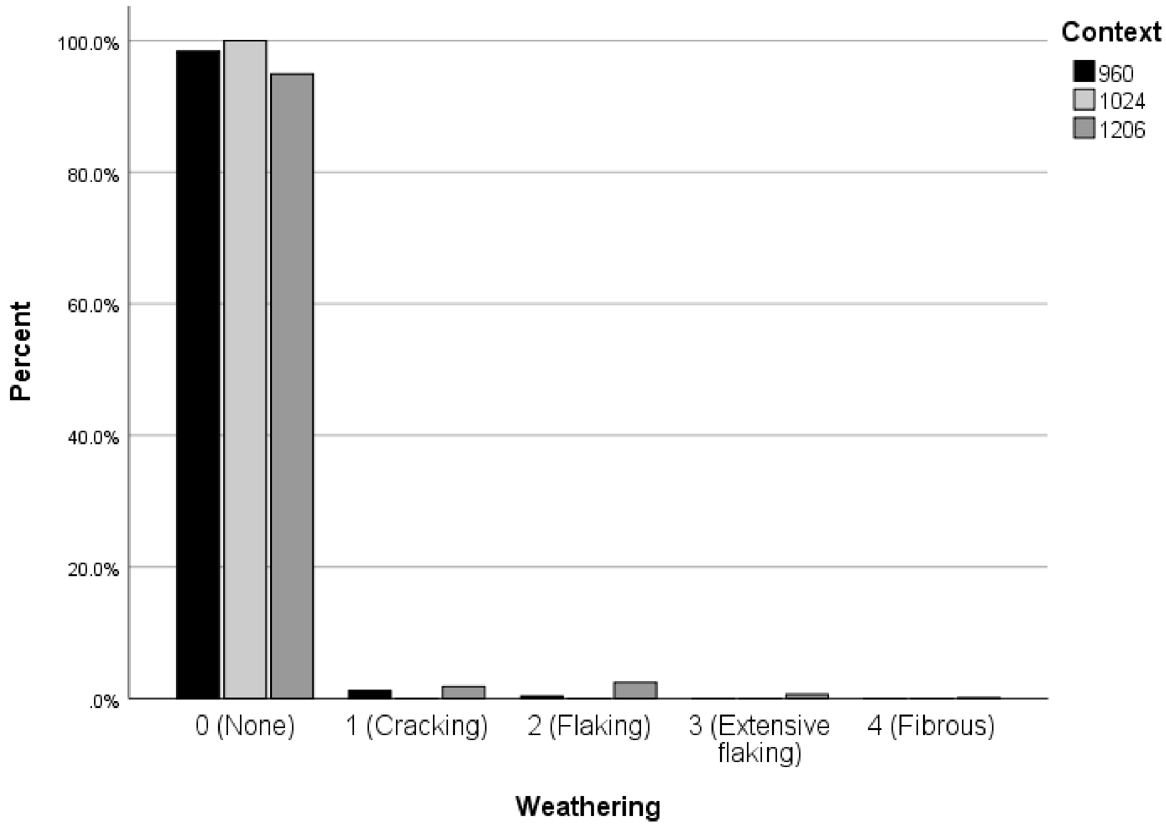


Figure 7.59: Weathering in Shrine contexts.

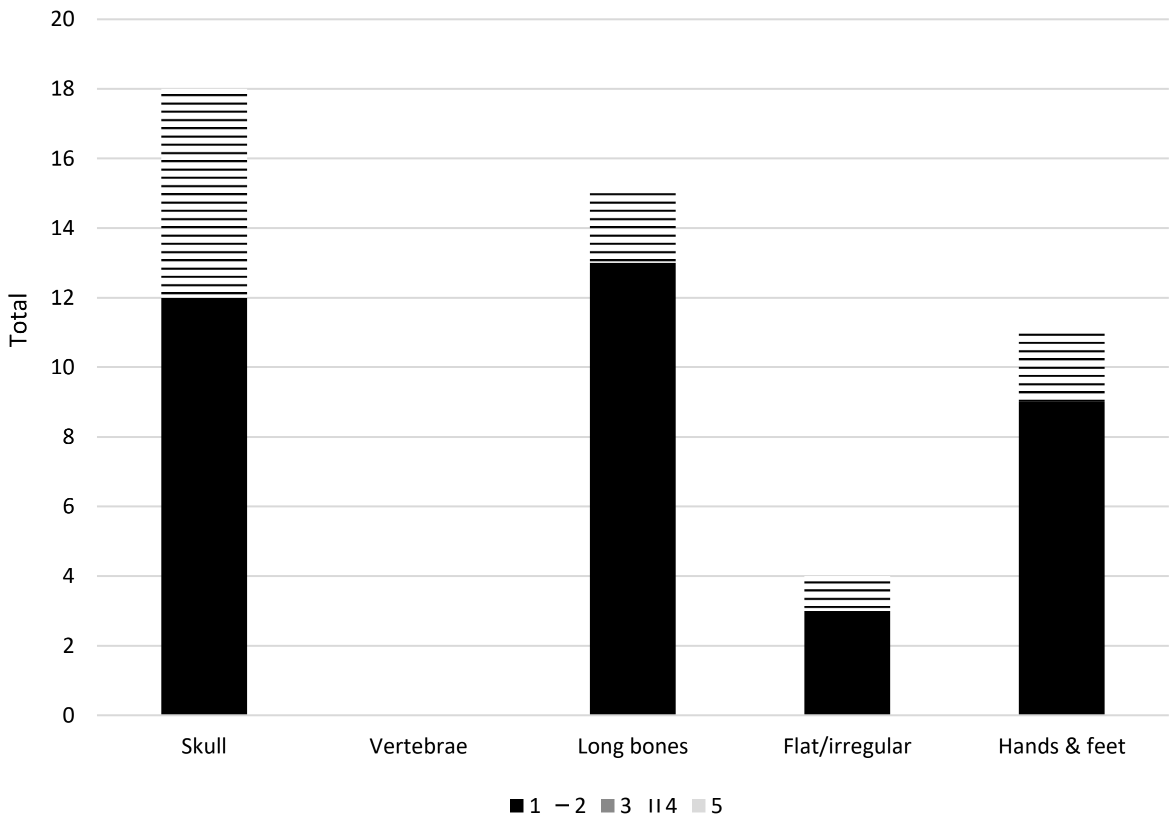


Figure 7.60: Weathering scores divided by bone type in (960).

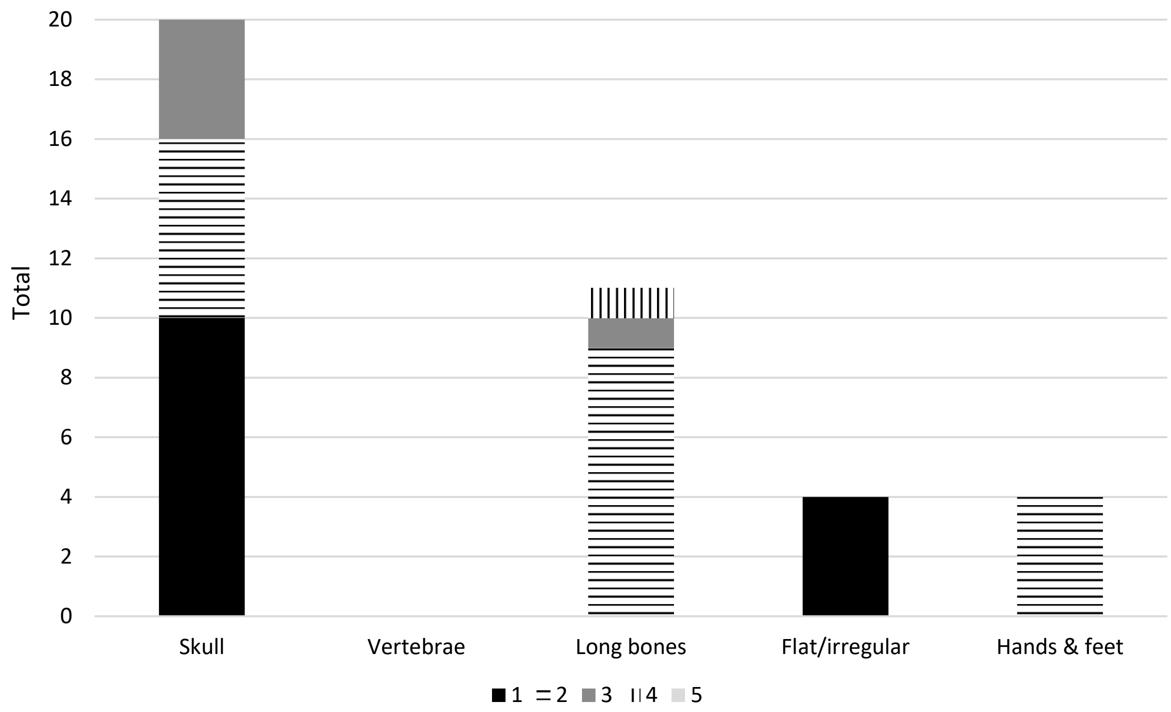


Figure 7.61: Weathering scores divided by bone type in (1206).

7.5.3.4 Abrasion and erosion

Minimal abrasion and erosion were observed on 8.9% of the sample, with a mean score of 0.09 (std. dev. 0.303) (Figure 7.62). Much erosion is due to root etching, particularly in (960). Divided by bone type, there are no clear trends, and abrasion/erosion is roughly consistent across all elements present in each context (Figures 7.63–65).

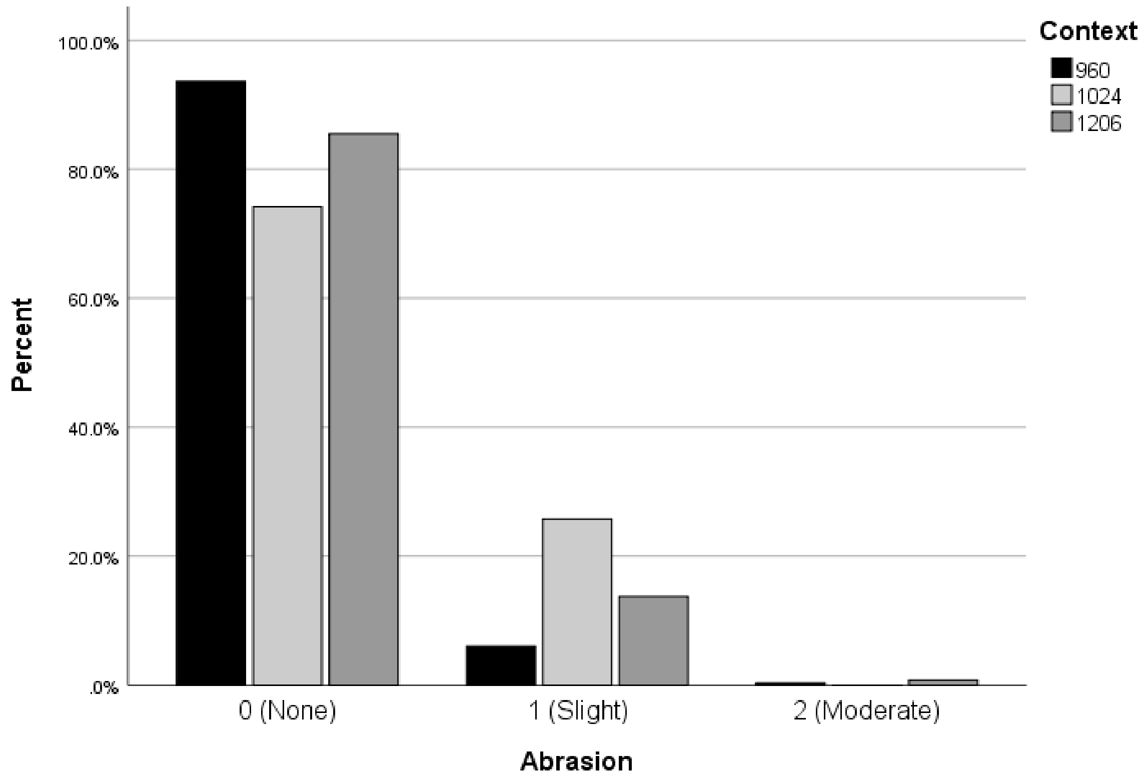


Figure 7.62: Abrasion/erosion in Shrine contexts.

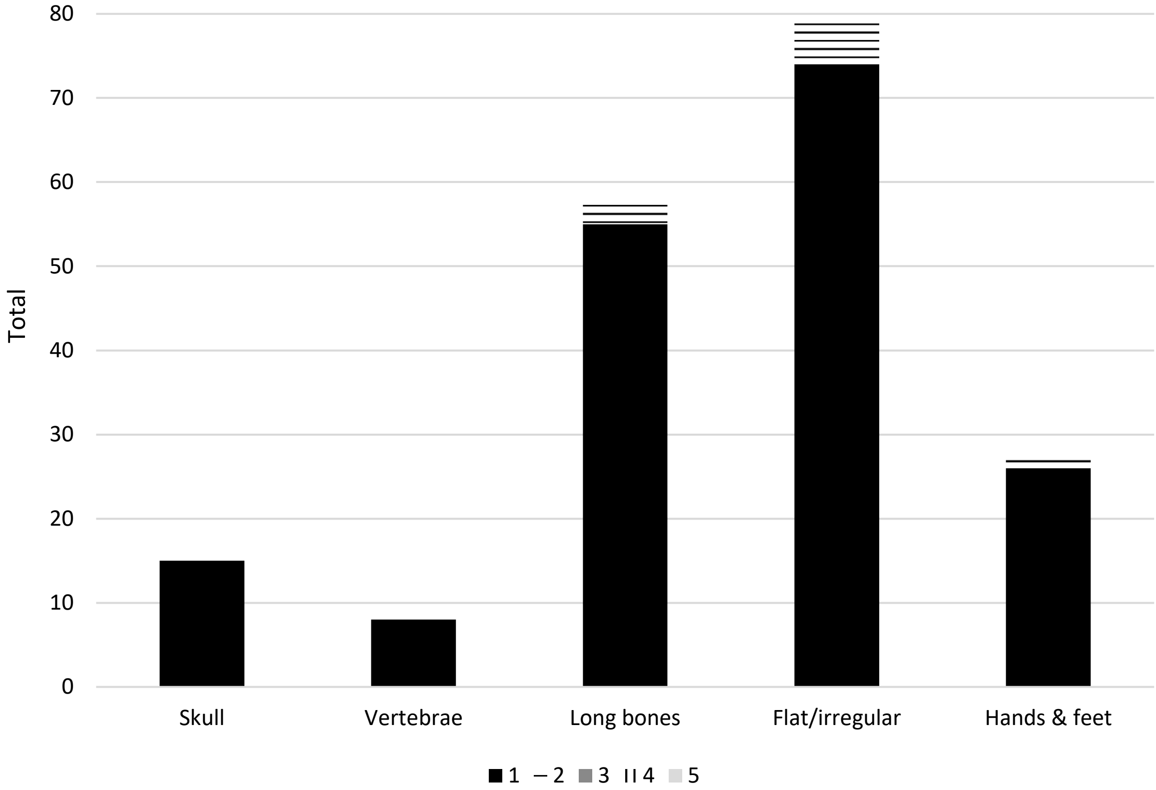


Figure 7.63: Abrasion/erosion divided by bone type in (960).

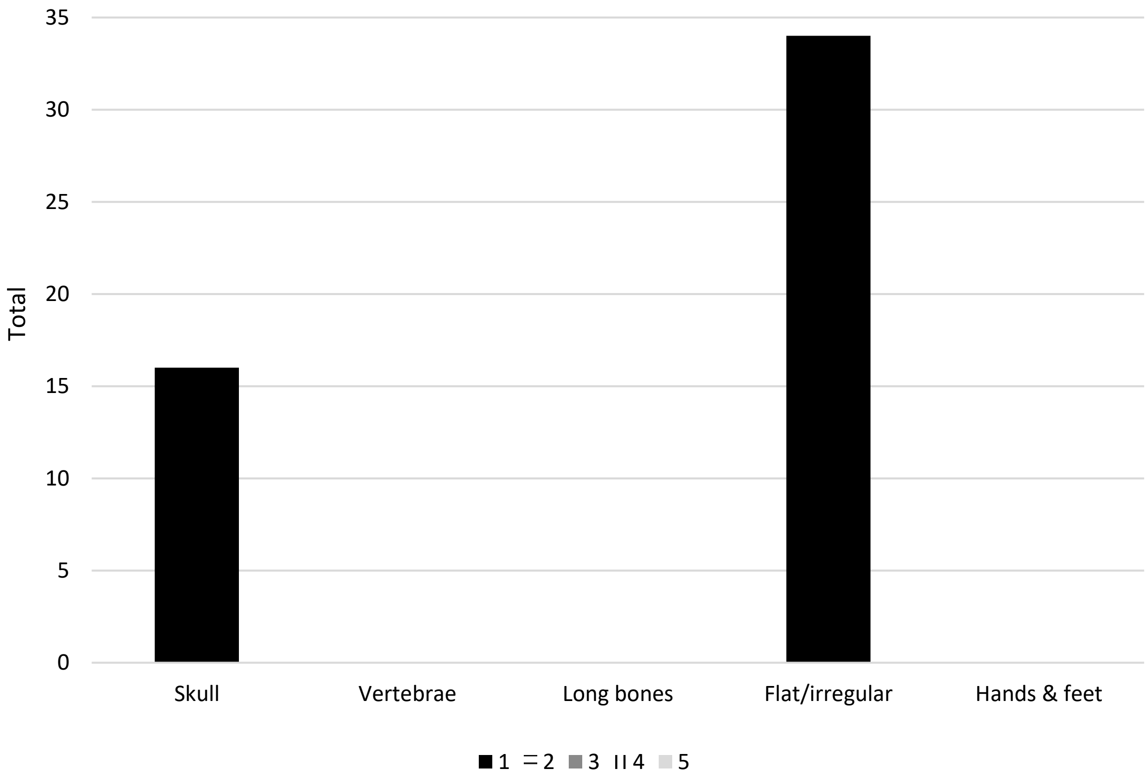


Figure 7.64: Abrasion/erosion divided by bone type in (1024).

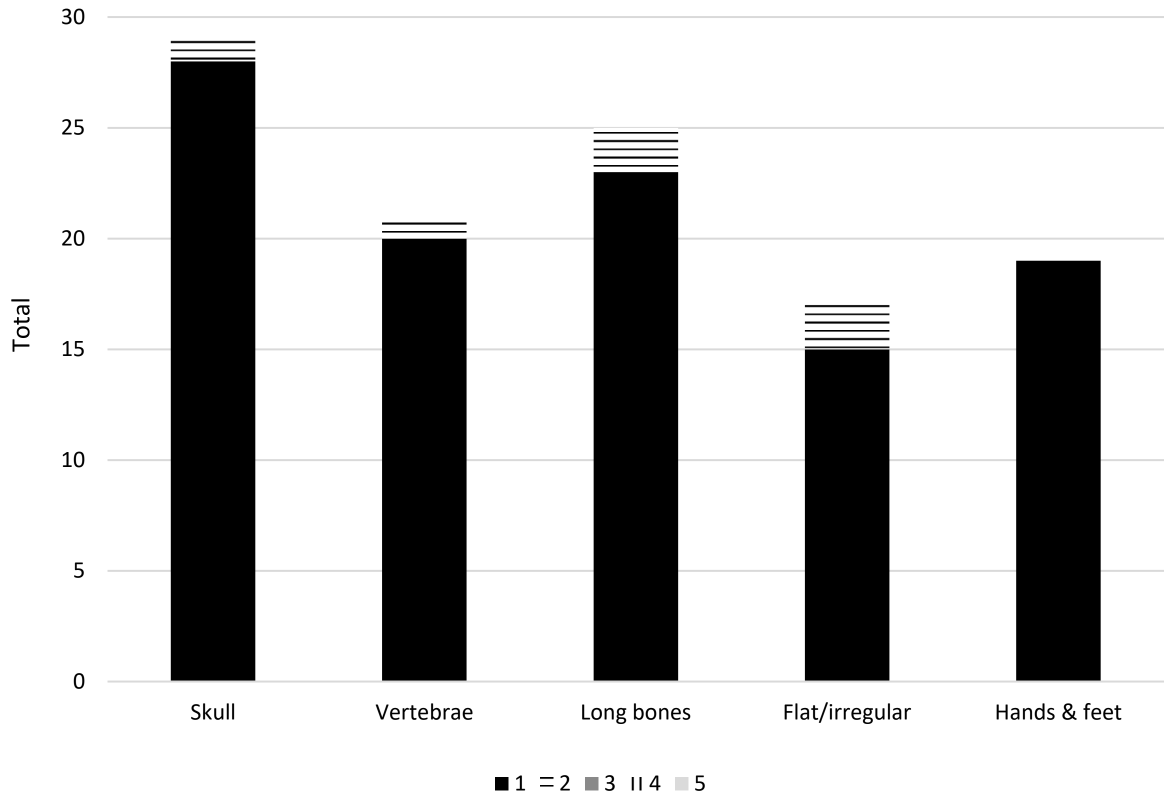


Figure 7.65: Abrasion/erosion divided by bone type in (1206).

7.5.3.5 Discolouration and burning

Discolouration and concretion were observed on 280 fragments (7.2%), 50% of which presented ochre staining, ranging from small flecks to coverage of the full bone surface. Limestone adhesion was observed on 14 fragments, and the remaining discolouration was attributed to root and mineral staining. Five fragments displayed brown patches consistent with burning, with one fragment clearly burnt following fragmentation. The colour and limited extent of burning indicates charring.

7.5.3.6 Articulation

In situ articulation was examined through for several individuals, summarised in Table 7.6.

Context	Grid	Spit	Unit Nos.	Age & sex
(960)	99E/114N	4	5–13	Old adult male
(960)	100E/111N	1	2	Perinate, 38–39 weeks
(1206)	99E/111N	3	5	Infant, 3–5 months
(1206)	99E/111N	1	18	Perinate, c. 40 weeks
(1206)	99E/111N	1	2,5,7,8	3 neonate–infant individuals (commingled) in adult right arm
(1206)	98E/110N	4	23, 25	Perinate commingled with infant and child

Table 7.6: Semi-articulated individuals analysed from Shrine contexts.

There is one semi-intact inhumation within context (960): an adult male placed on their left side and tightly contracted (Figure 7.66). It is difficult to discern whether the acetabulo-femoral joint was maintained *in situ*, as the right limbs are not depicted (perhaps removed as part of the funerary rite or lifted prior to recording). Some discrepancies amongst the long bones suggest they do not all belong to the same individual. The original analysis noted differences between the upper and lower limbs (Stoddart, Barber *et al.* 2009, 323) which may be less pronounced following re-analysis (E. Parkinson pers. comm.). However, the left humerus, ulna and radius are inconsistent with one another; the left ulna does not articulate well with the humerus, and the radius is significantly shorter than the ulna (Figures 7.67–7.68). The left ilium is smaller, displays a different curvature, and produced a different age estimate to the right ilium (auricular surface morphology estimated age 30–34 years for the left ilium and 40–44 years for the right ilium) (Figure 7.69). There are at least three interpretations of these discrepancies: (1) this individual could represent a composite skeleton (cf. Hanna *et al.* 2012); (2) some long bones were removed post-mortem and nearby disarticulated elements mistaken as belonging to this skeleton, or (3) some elements were transferred into wrongly labelled bags during or after excavation. Taphonomically, this individual is in a similar condition to most of the disarticulated remains within (960), and there is nothing to suggest their unusual treatment, such as prolonged curation, as the first scenario would require.

Figure 7.66: Adult male in (960) 99/112 spit 4 (photo from BRX archive).

Figure 7.67: Left humerus, ulna and radius of adult male in (960). The ulnar trochlear notch is too broad medio-laterally for the corresponding trochlea of the humerus (photo by author).

Figure 7.68: Left ulna and radius of adult male in (960). The left radius is too short and clearly inconsistent with the ulna (photo by author).

Figure 7.69: Anterior view of left and right ilia of the adult male in (960). The left ilium is clearly smaller, with darker colouration, a less pronounced sigmoid curvature and more rugose iliac crest. The angle of the greater sciatic notch is also more acute; scale: 1 cm (photo by author).

A neonate from 100E/111N in (960) was curated in an individual box with a polaroid of its *in situ* position (Figure 7.70). The individual appears to have been deposited in a flexed position and placed on their left side. Elements from the right side are notably more fragmentary and less well-preserved, due to disturbance from upper deposits. Measurements from the left femur (L: 70 mm) and left ilium (L: 32 mm; W: 29 mm) estimate their age at 38–39 weeks old. The skeleton is relatively complete, with 11 ribs identifiable from each side, although both radii, ulnae and fibulae are absent. Given their excellent preservation and articulation, the absence of these long bones is conspicuous, strongly suggesting their selective removal some time after this individual was deposited.

Figure 7.70: Neonate in context (960) (photo by author).

Varied levels of completeness were observed across all nonadults analysed in (1206), from a nearly complete cranium, torso and upper limbs of a perinate (Figure 7.71), to only cervical and thoracic vertebrae, some ribs, claviculae and basicranium of an infant (Figure 7.72). The perinate (approximately 40 weeks old) in 99E/111N spit 1 presents an interesting pattern of preservation: of the upper limb bones, the humeri are absent, and of lower limb bones, only fibulae are present. The humeri, femora and tibiae were perhaps selectively removed.[5] The other individual analysed in spit 1 represents an adult right arm encircling a perinate. Analysis showed the perinate to be commingled with the disarticulated remains of at least two further individuals of neonatal–infant age. However, no humeri or femora were present, and two fragments of fibula represented the only elements of the lower limbs. A clear, recurring pattern of selective long bone removal is borne out across these individuals.

These results accord with the evidence from (783) for a sequential process of disarticulation—with limbs removed in stages, and skulls removed as a final step. While a residual signature of selective removal is usually indicated by the over-representation of small bones, elements of the extremities are exceptionally prone to degradation in young individuals. The residual signature noted in this study, of a high representation of the axial skeleton, highlights the primary deposition and selective removal of elements from nonadults.

[5] They appear to have been in a discrete area *in situ* and it is therefore unlikely they were missed during excavation.

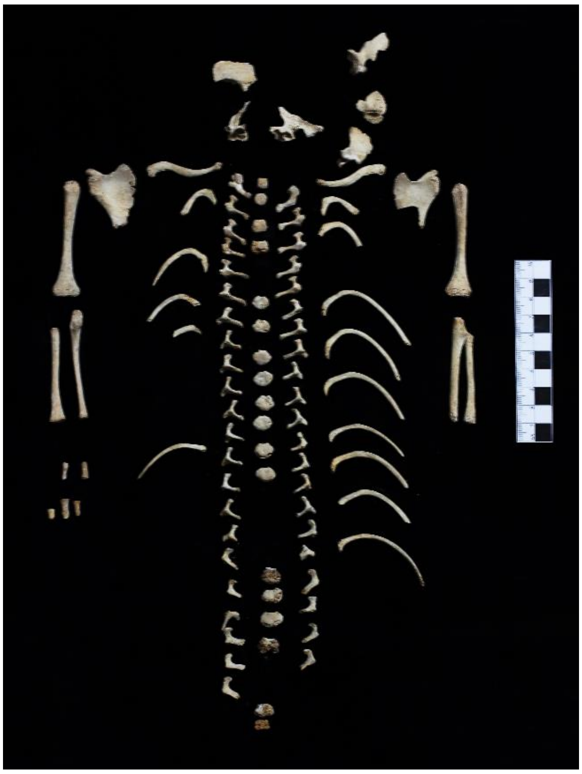


Figure 7.71: Perinate in (1206) 98E/110N spit 4 unit 23, 25. All skeletal elements inferior to and including the pelvis are absent (photo by author).

Figure 7.72: Infant (1206) 99E/111N spit 3 (Skeleton 19). The calvarium, facial bones, all limbs and the pelvis are absent (photo by author).

7.5.3.7 Skeletal element representation

In both (960) and (1206), representation was almost consistent, suggesting dominant practices of primary interment, while a more selective profile is evident in (1024) (Figure 7.73). In (960), metatarsals and ulnae are the best-represented elements (32–32.6%), demonstrating similar preservation of small and robust bones. The low level of preservation in this context is consistent with high fragmentation as a result of successive deposition, as in (783).

Element representation in (960) accords with its original descriptions as 'anatomically correct', as most elements are present in similar quantities (Stoddart, Barber *et al.* 2009, 320), although this phrasing is somewhat misleading. Elements which are small or high in cancellous bone are nearly always under-represented in primary interments, owing to taphonomic degradation (Robb 2016). These elements are some of the best represented within (960) and long bones are slightly lacking in comparison. Radii and fibulae are under-represented, and femora only represent 22% of the MNI. Drawing upon the evidence for articulations—several regions were observed to articulate in the lab, and skulls were encountered with corresponding upper cervical vertebrae—(960) represents multiple depositional practices. Primary inhumations were made (with two discussed above) but many were disturbed, and long bones probably selectively removed.

Context (1024) covered both the Shrine and Display zone and presents a clear over-representation of crania. Alongside this, an emphasis on the axial skeleton and pelvic girdle is evident (the pelvis is the second best-represented element, at 50% of the BRI). Given the small number of bones in this context, and its large distribution across the centre of the site, it most likely represents selective deposition, primarily of disarticulated crania.

In (1206), crania are the best represented element (66.7%) followed by claviculae (55.6%). The presence of bones of the axial skeleton and extremities indicates primary deposition. Elements of the lower limbs are less well-represented compared to the upper limbs, suggesting a patterned removal of selected elements. The relatively low representation of small and friable elements, such as the sternum, patella and foot bones, is exacerbated due to the high number of young individuals in this sample.

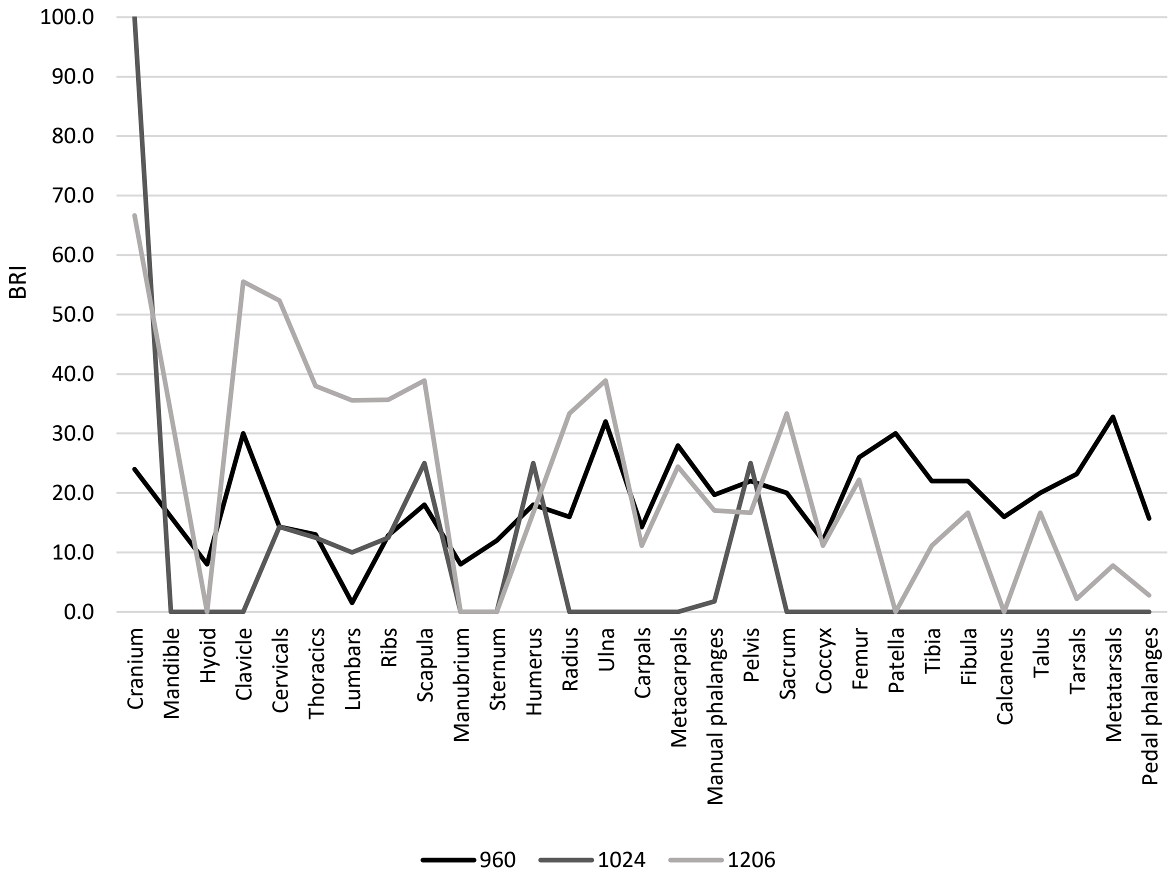


Figure 7.73: Skeletal element representation in Shrine contexts.

7.5.3.8 Summary of the Shrine

Overall, fragmentation was highest in (1206), though more of the sample from (1024) was incomplete (Table 7.7). Most bones were well preserved. Abrasion and erosion were lowest in (960), and only affected >25% of the sample in (1024). Weathering was also minimal, noted only on a small percentage of the sample in (960) and (1206). Burning was present on five fragments in (960) and there was no evidence of animal damage or cutmarks. Analysis of semi-articulated individuals consistently revealed selective long bone removal following primary deposition across one adult and several nonadults in (960) and (1206). SER illustrates varied funerary practices throughout the Shrine. Both (960) and (1206) reflect successive primary interments which have been substantially disturbed and rearranged, while (1024) represents selective re-deposition of cranial and cranial fragments across a large area.

Taphonomic feature	1024	960	1206
<5cm in size	135 (69.6%)	2384 (80.7%)	658 (96%)
<1/2 complete	157 (80.9%)	2017 (68.4%)	511 (66.8%)
<1/2 surface well preserved	77 (39.7%)	472 (16%)	166 (21.7%)
Abrasion/ erosion	50 (25.8%)	187 (6.3%)	111 (14.5%)
Weathering	0	48 (1.6%)	39 (5.1%)
Burning	0	5 (0.2%)	0
Insect damage	0	0	0
Rodent gnawing	0	0	0
Cutmarks	0	0	0
MNI	2	25	9
Total analysed	194	2953	765

Table 7.7: Summary of taphonomic results from Shrine contexts.

7.6 East Cave

The contexts analysed from the East Cave represent some of the earliest and latest dated depositions (see §4.3.1). The Southwest niche, an early rock-cut tomb which was later enlarged and re-used, contained a series of distinct fills including a large deposit (595) with >4 kg of ceramics (Malone *et al.* 2009, 103). The Central pit, one of two pits at the southern end of the megalithic threshold, contained articulated nonadult inhumations dated to the late Tarxien (Stoddart, Malone *et al.* 2009, 118–122).

7.6.1 Central pit: (436), (743)

Two contexts from the fill of the Central pit [437] in the East Cave roof were sampled (Table 7.8). The pit contained a sequence of articulated nonadult inhumations, interrupted by silting, and truncated by the slumping of the cave roof. All remains which could be located from both contexts were analysed, though the NISP obtained is lower than the original (Stoddart, Malone *et al.* 2009, 121) suggesting more remains were excavated than could be identified in the course of this research. Context (719) was ascribed specifically to the inhumation but could not be located, and (741) was also not found.

7.6.1.1 Completeness, preservation and fragment size

High fragmentation was observed in both contexts, with most fragments representing <25% of the element (Figure 7.74). Overall, the mean API is 1.45 (std. dev. 1.08). Bone preservation is poor, with most cortical surfaces not preserved in (436) and most only 1–24% preserved in (743) (Figure 7.75). The mean QBI is 0.99 (std. dev. 1.18). Mean fragment size is 2.85 cm (std. dev. 2.20) and maximum fragment length is 161–170 mm (Figure 7.76).

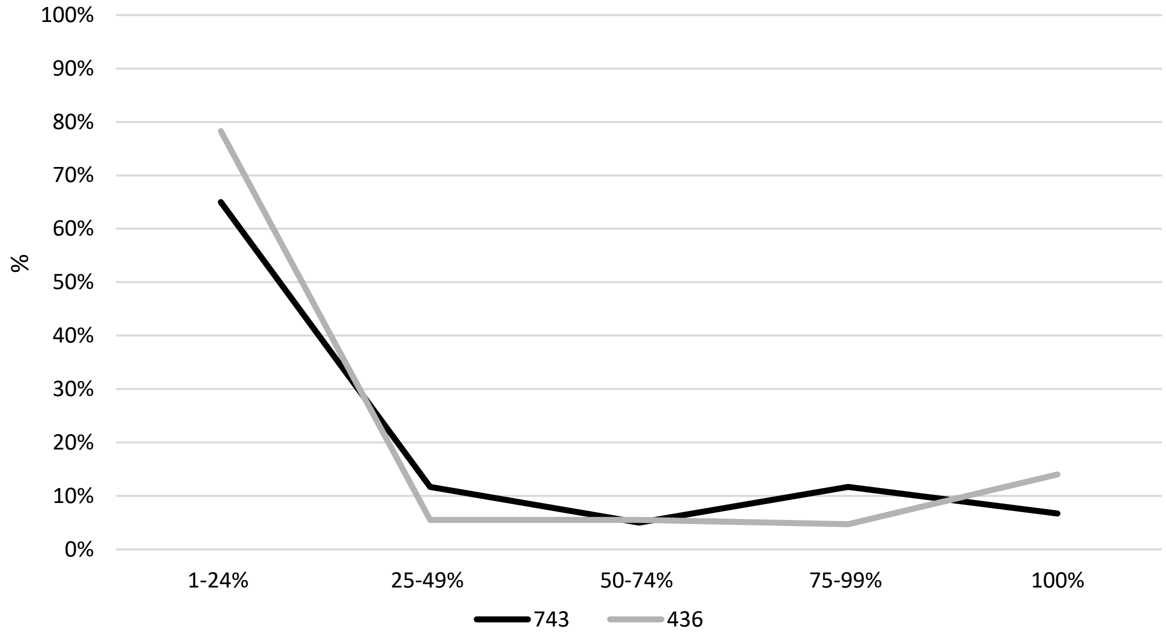


Figure 7.74: Bone completeness (API) in Central pit contexts.

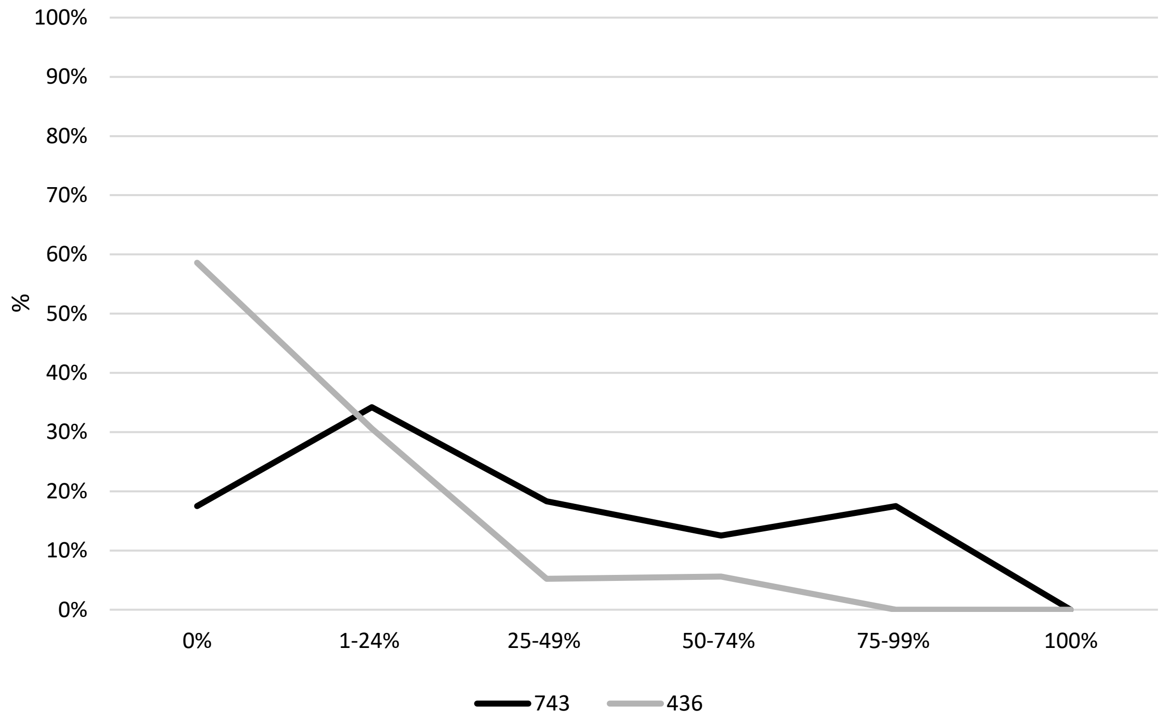


Figure 7.75: Bone preservation (QBI) in Central pit contexts.

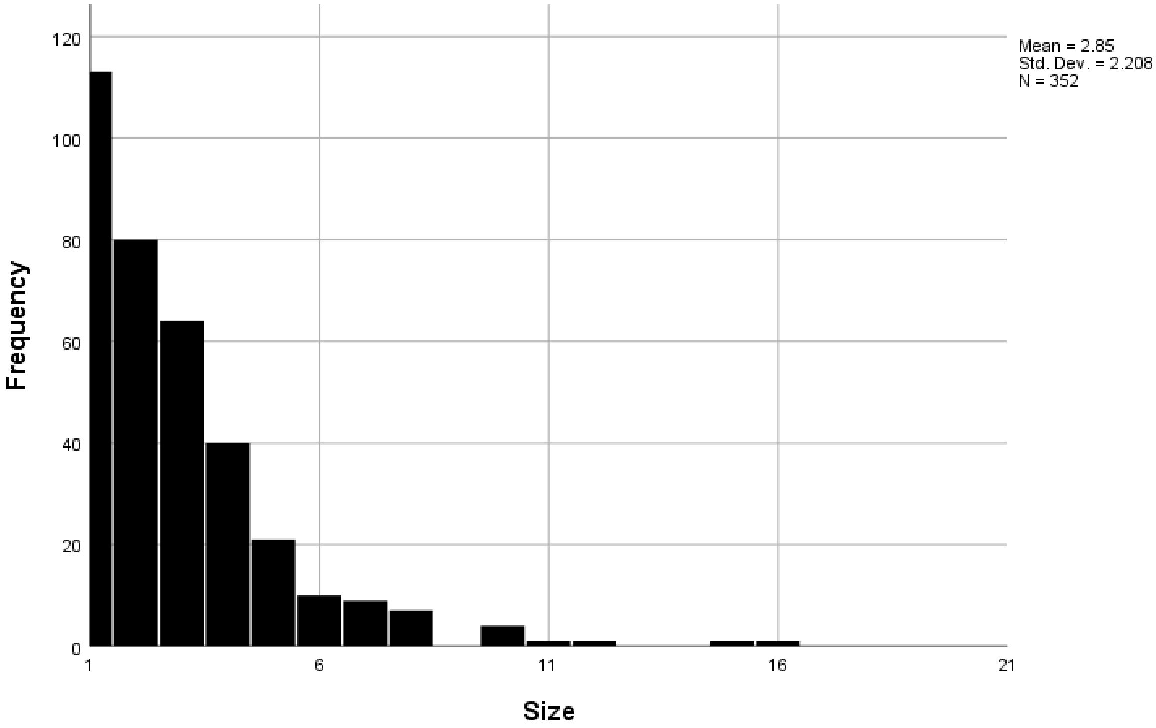


Figure 7.76: Fragment size in Central pit contexts.

7.6.1.2 Fracture morphology

All long bone fragments in both contexts displayed dry bone fractures (Figure 7.77), indicating that inhumations were not disturbed following deposition and that the collapse of the East Cave roof occurred a significant time after burial ceased in this area.

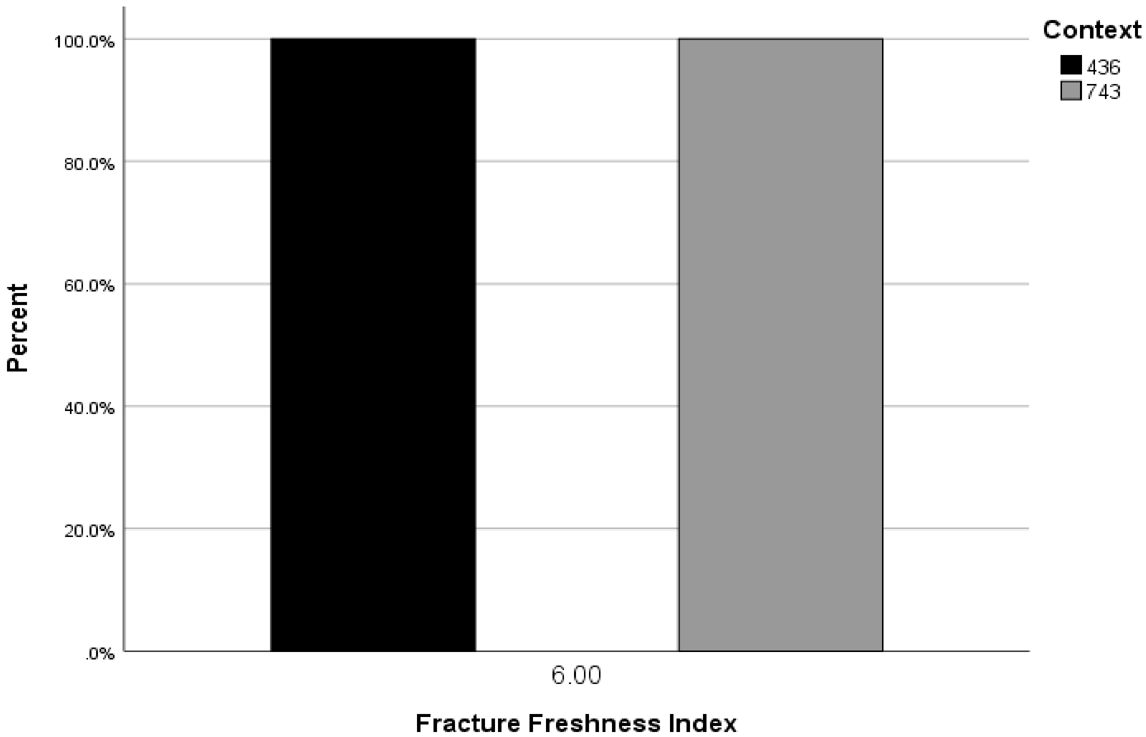


Figure 7.77: Total FFI recorded for long bone fragments in the Central pit.

7.6.1.3 Weathering

Minimal weathering was observed in both contexts, with a mean score of 0.04 (std. dev. 0.19). Cortical cracking was present on a small number of fragments and was slightly more prevalent in (436) (Figure 7.78). The low presence and extent of cortical cracking suggests this is likely due to *in situ* degradation; a small number of compression fractures were observed, along with concreted elements, as overlying deposits were both heavy and prone to inundation.

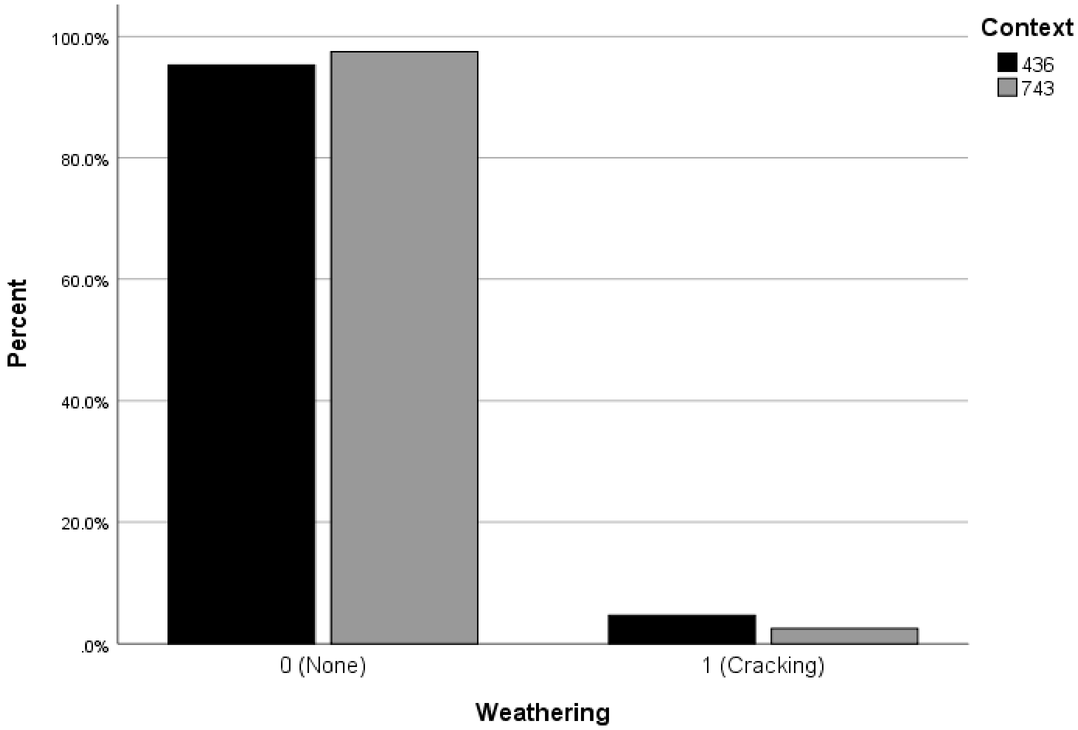


Figure 7.78: Weathering in Central pit contexts.

7.6.1.4 Abrasion and erosion

Abrasion and erosion were likewise low in both contexts, with a mean score of 0.08 (std. dev. 0.26). Slightly more erosion was observed in (743) (Figure 7.79), and is mostly attributed to root etching.

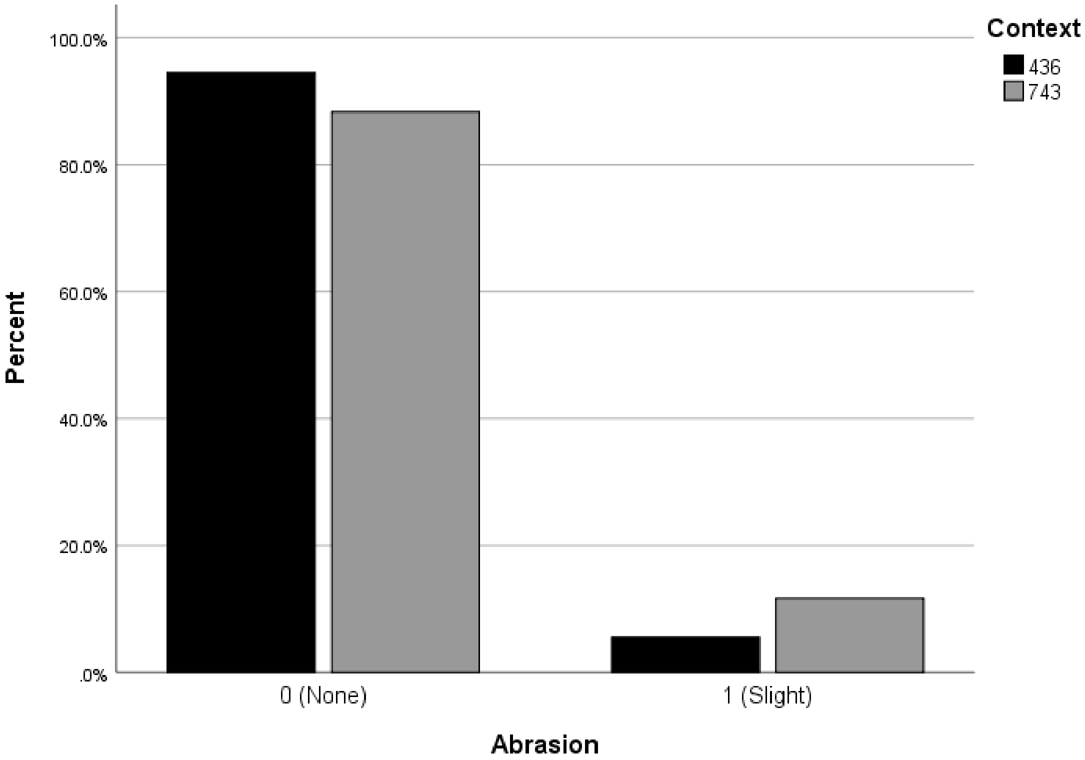


Figure 7.79: Abrasion and erosion in Central pit contexts.

7.6.1.5 Discolouration

No discolouration or burning was observed, although 43 fragments presented sediment adhesion and concretion, including concretion with other bone fragments.

7.6.1.6 Articulation

As described, slumping truncated the inhumations below the pelvis (Stoddart, Malone *et al.* 2009, 121–122), resulting in the preservation of only upper body and thoracic elements (e.g. Figure 7.80). Some *in situ* articulations were preserved through concretion, including a humero-ulnar joint (Figure 7.81), an ulna and radius, and a right first metacarpal and proximal phalanx. All individuals in this pit were found supine, head to the East, overlying one another. A similar pattern of overlying nonadult primary depositions is evident in context (783), in grid 97E/112N (see §7.4.2.6). Unfortunately, as it was not possible to fully analyse the remains, age could not be determined.

Figure 7.80: Polaroid photograph of disturbed inhumation in (743), spit 3, showing articulated thoracic region (photo from BRX archive).

Figure 7.81: Left humerus and ulna preserved in articulation by concreted matrix; scale: 1cm (photo by author).

7.6.1.7 Skeletal element representation

Element representation is markedly low and uneven in both contexts, with radii the best-represented element (33.3–37.5% of the BRI) (Figure 7.82). Based on element representation alone, these contexts would at best present a weak pattern of long bone curation and admixture with residual elements. The under-representation of some small bones is emphasised due to the higher numbers of upper limb bones, but the preservation of the hyoid and hand bones is notable. Elements of the axial skeleton seem to have been especially degraded due to poor preservation and compaction. These results reveal some of the difficulties of interpreting element representation without contextual data. Slumping is responsible for the relative absence of lower limb bones (with only some femora and tibiae fragments in 436) which has resulted in a biased profile of element representation.

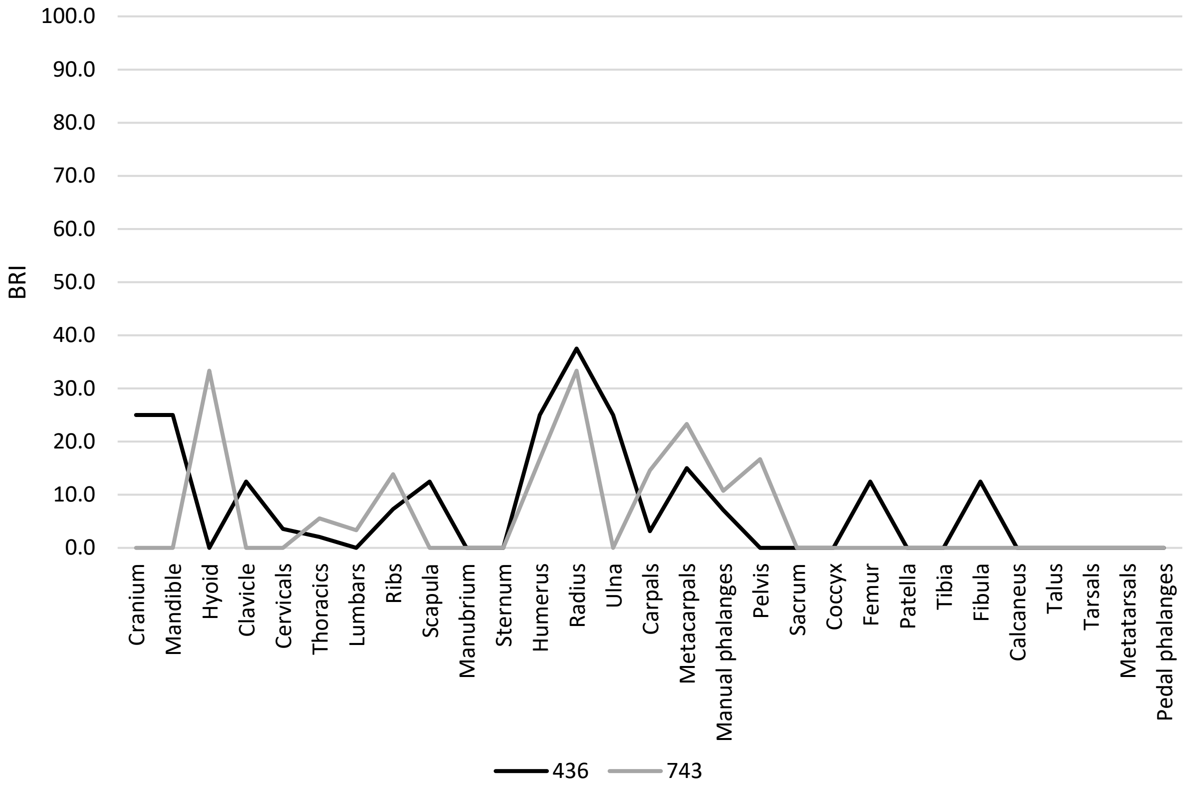


Figure 7.82: Skeletal element representation in Central pit contexts.

7.6.1.8 Summary of the Central pit

Remains in the Central pit were exceptionally fragmentary and poorly preserved, and moreso in (436) compared to (743) (Table 7.8). However, abrasion, erosion and weathering were minimal, and the poor preservation is largely attributed to compaction and sediment concretion. Post-depositional cycles of inundation, as well as cave roof collapse, adversely affected these contexts. There was no evidence of animal damage, burning or cutmarks. SER demonstrates the low preservation of elements, as well as their biased representation, reflecting degradation especially of small and friable bones, and the over-representation of long bones.

Taphonomic feature	**436**	**743**
<5cm in size	204 (86.8%)	93 (77.5%)
<1/2 complete	197 (83.8%)	92 (76.7%)
<1/2 surface well preserved	219 (93.2%)	84 (70%)
Abrasion/erosion	13 (5.5%)	14 (11.7%)
Weathering	11 (4.7%)	3 (2.5%)
Burning	0	0
Insect damage	0	0
Rodent gnawing	0	0
Cutmarks	0	0
MNI	4	3
Total analysed	235	120

Table 7.8: Summary of taphonomic results from Central pit contexts.

7.6.2 Southwest niche: (595), (656), (734)

Three contexts from the southwest niche were sampled. All remains which could be located from (595) were analysed, along with two other possible Żebbuġ contexts (734), (656). The material from these contexts was comparable, with surface colouration and modification similar throughout. Most elements were curated in individual bags, and these often included many small fragments which refitted, suggesting deposition of complete elements and *in situ* fragmentation.

7.6.2.1 Completeness, preservation and fragment size

All contexts contained highly fragmented remains, although (595) presented slightly better preservation (Figure 7.83). Overall, the mean API is 1.91 (std. dev. 1.438). Bone preservation is fair in (734), with cortices mostly 25–49% preserved, and good in the other contexts, with most cortical surfaces 75–99% preserved in (595) and 100% preserved in (656) (Figure 7.84). The mean QBI is 2.82 (std. dev. 1.503). Mean fragment size is 2.95 cm (std. dev. 2.745) and maximum fragment length is 301–310 mm (Figure 7.85).

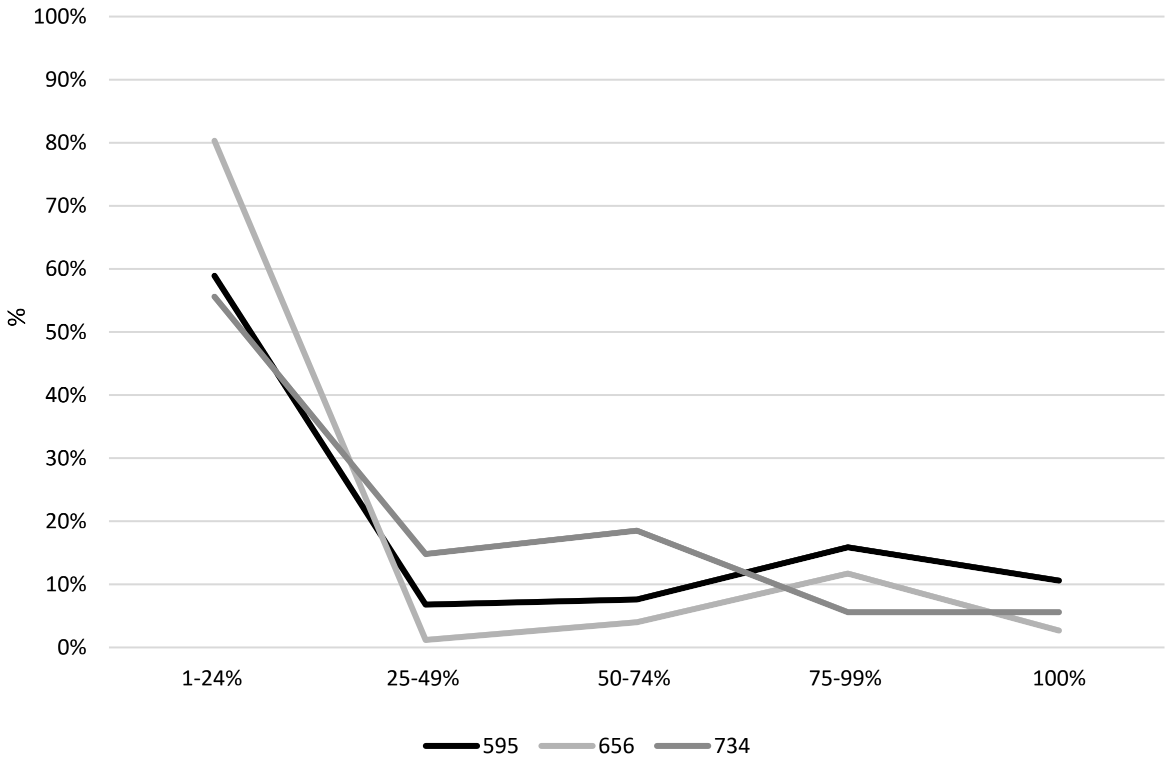


Figure 7.83: Bone completeness (API) in Southwest niche contexts.

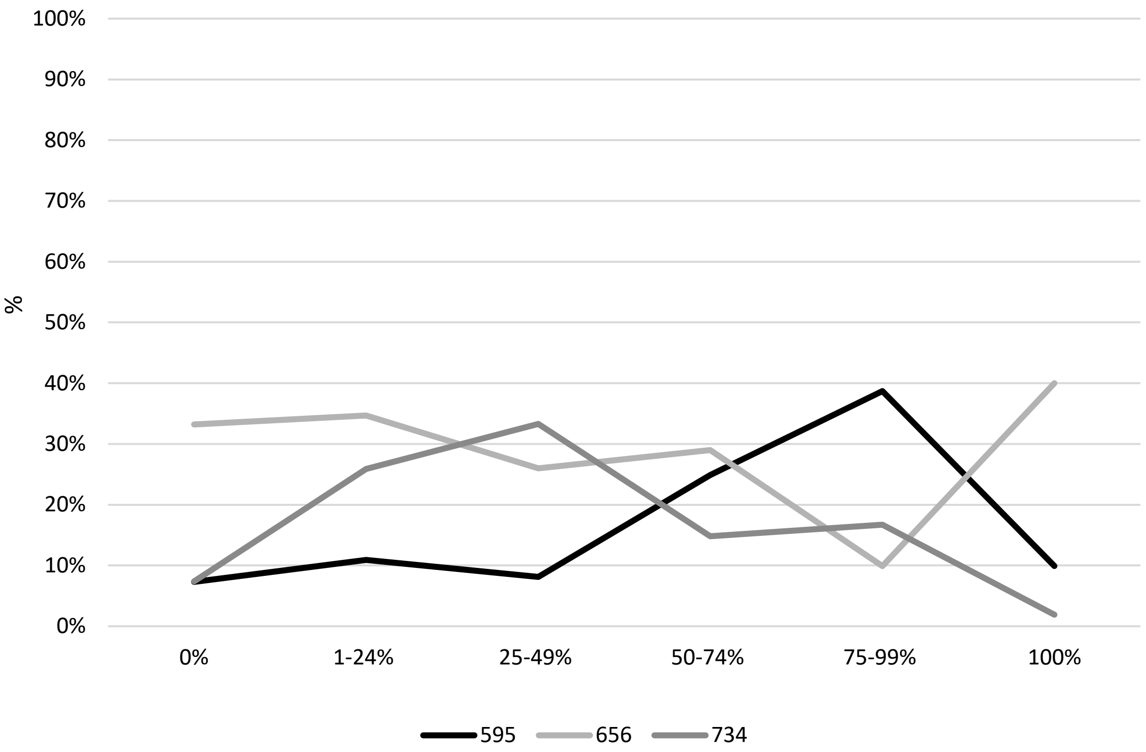


Figure 7.84: Bone preservation (QBI) in Southwest niche contexts.

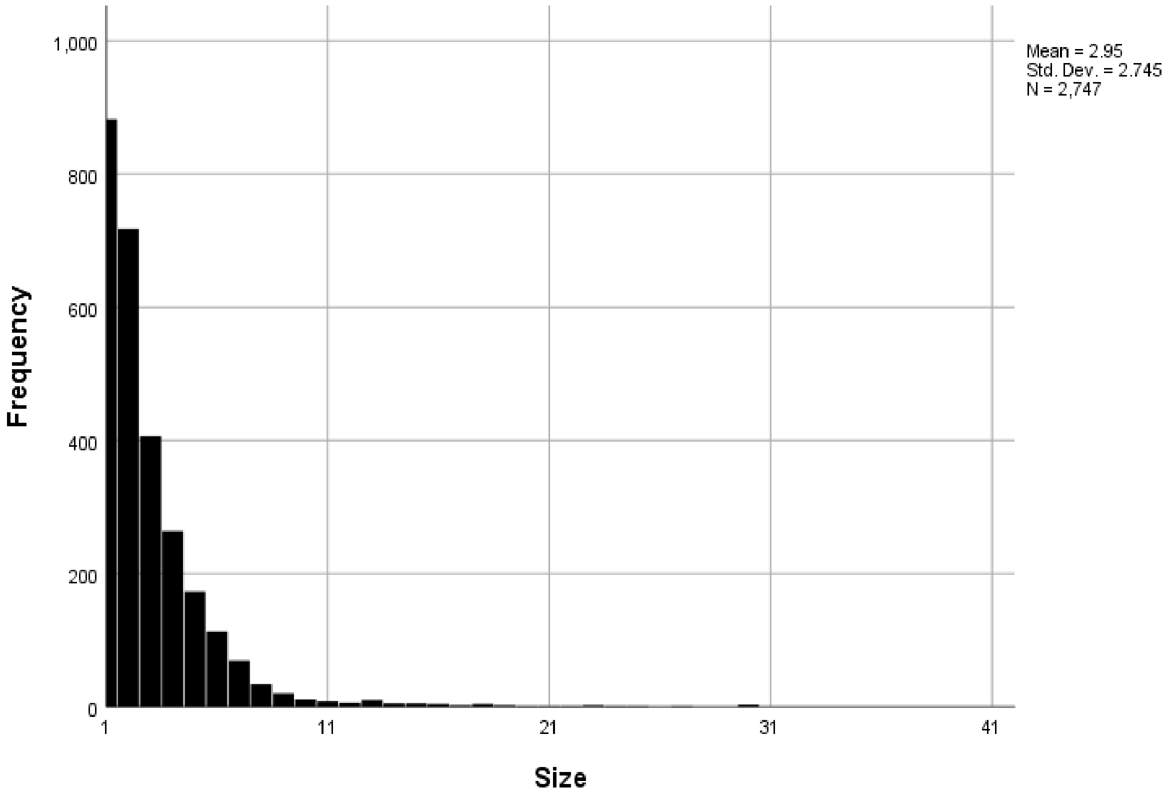


Figure 7.85: Fragment size in Southwest niche contexts.

7.6.2.2 Fracture morphology

The mean FFI score across all contexts is 5.97 (std. dev. 0.26). Five fragments displayed fractures with mixed characteristics, scored between 3–5 (Figure 7.86). No fresh bone breakage was observed; rather, the results suggest some bones were broken or crushed after deposition before bone was fully mineralised. Some dry bone fractures across long bone diaphyses refitted, indicating the deposition of complete elements in (595).

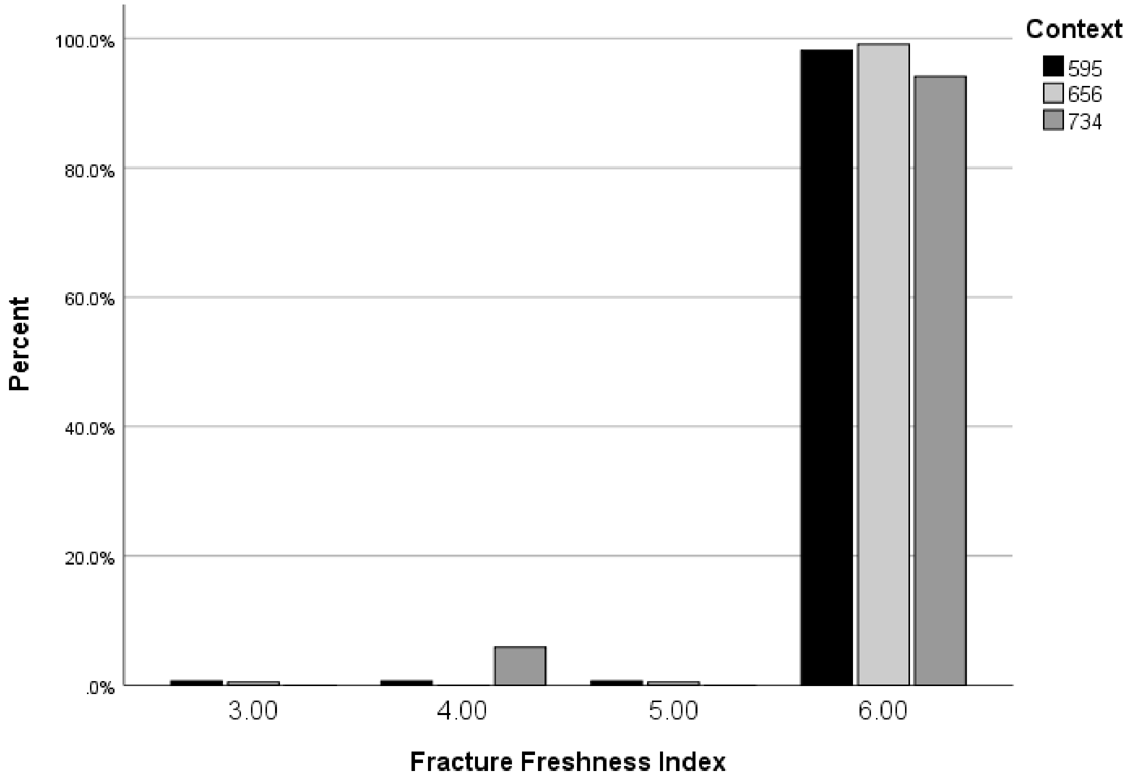


Figure 7.86: Total FFI recorded for long bone fragments in Southwest niche contexts.

7.6.2.3 Weathering

Weathering was minimal, with a mean score of 0.06 (std. dev. 0.303), observed mostly as cortical cracking on a small number of fragments (Figure 7.87). Within (595), bones of the extremities were mostly affected by weathering; this is distinct from many other contexts, where long bones and crania are usually the most weathered elements (Figure 7.88).

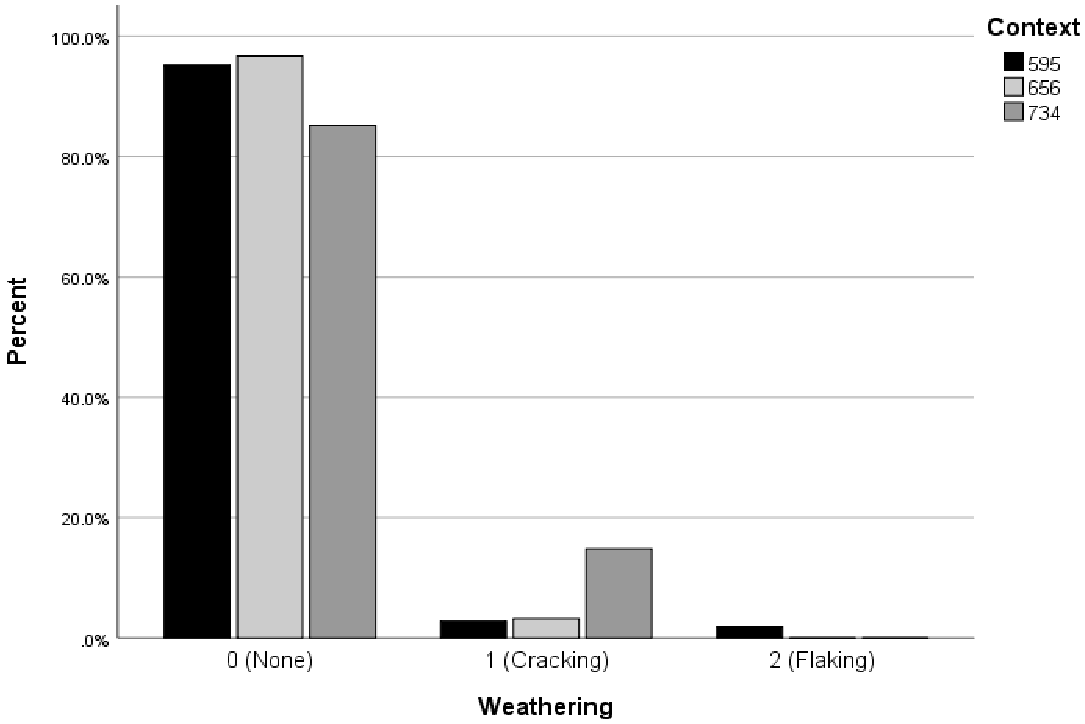


Figure 7.87: Weathering in southwest niche contexts.

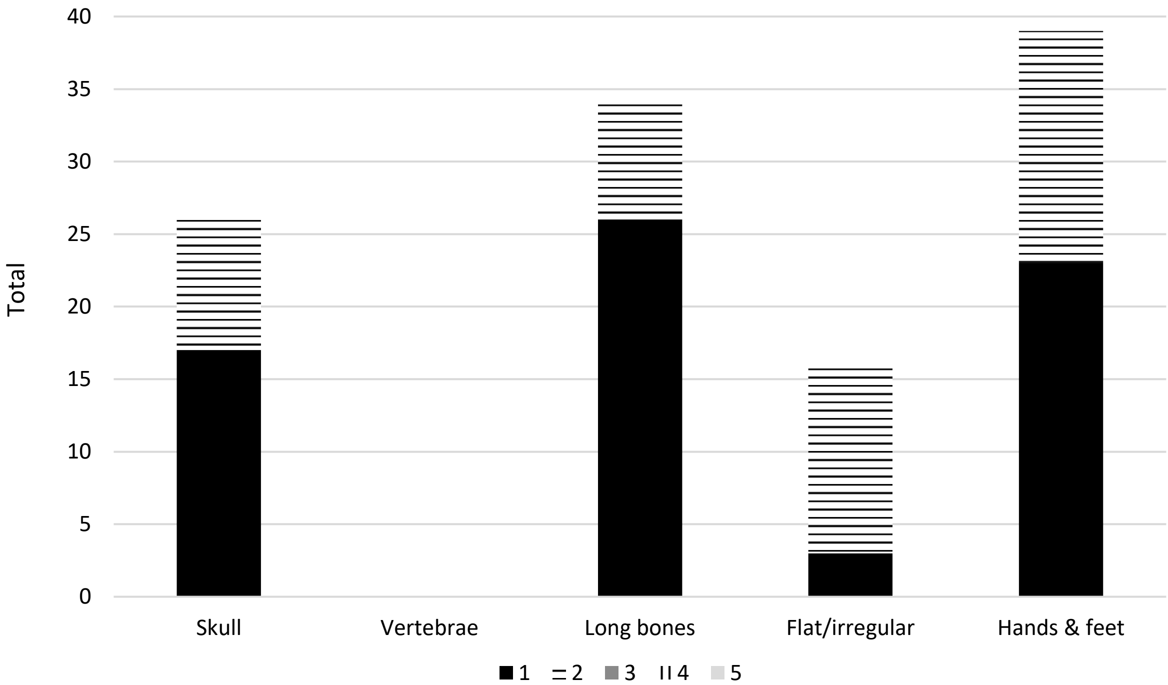


Figure 7.88: Weathering scores divided by bone type in (595).

7.6.2.4 Abrasion and erosion

The mean score for abrasion and erosion is 0.33 (std. dev. 0.684), although it is lower in (595) compared to (656) and (734) (Figure 7.89). In (595), erosion is attributed to root etching, which was extensive on some fragments, especially long bones (Figure 7.90). In (656) and (734), abrasion and erosion preferentially affected long bones, a distinct pattern which might suggest some of these elements were moved to this niche from elsewhere (Figures 7.91–92).

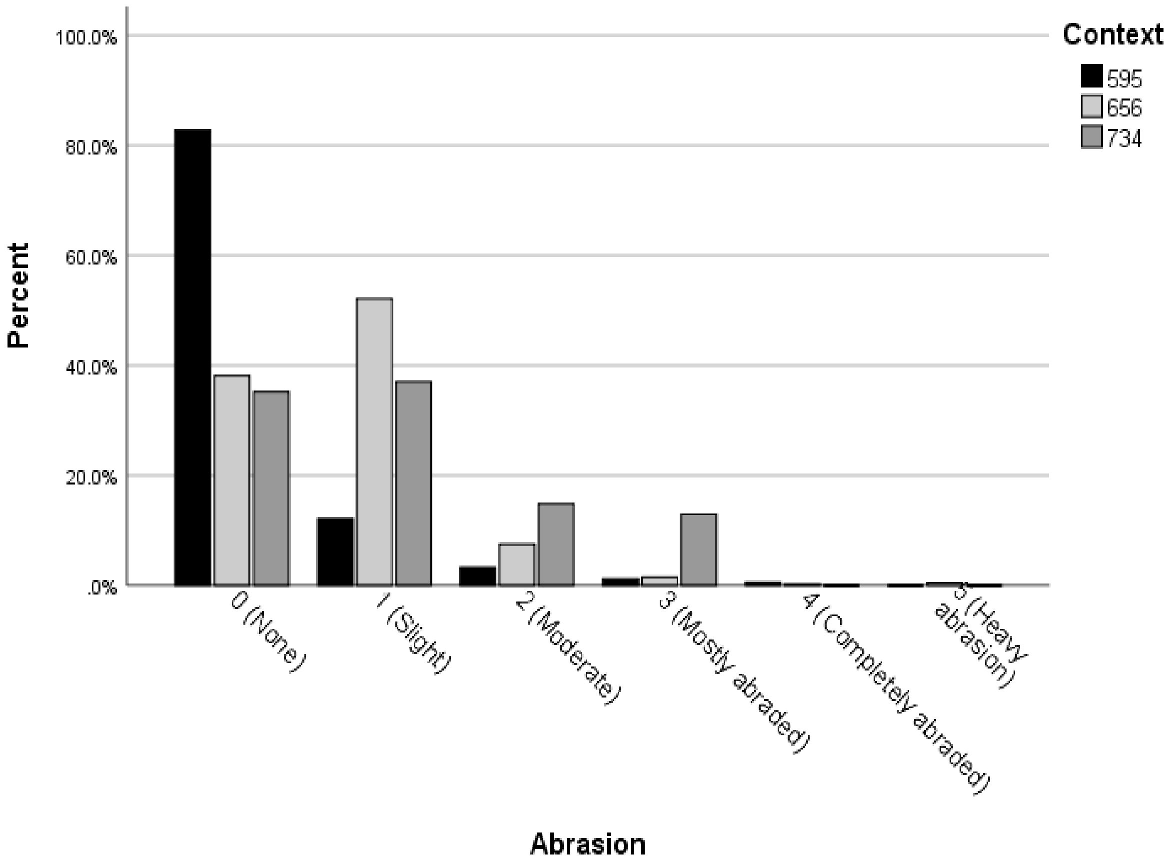


Figure 7.89: Abrasion and erosion in Southwest niche contexts.

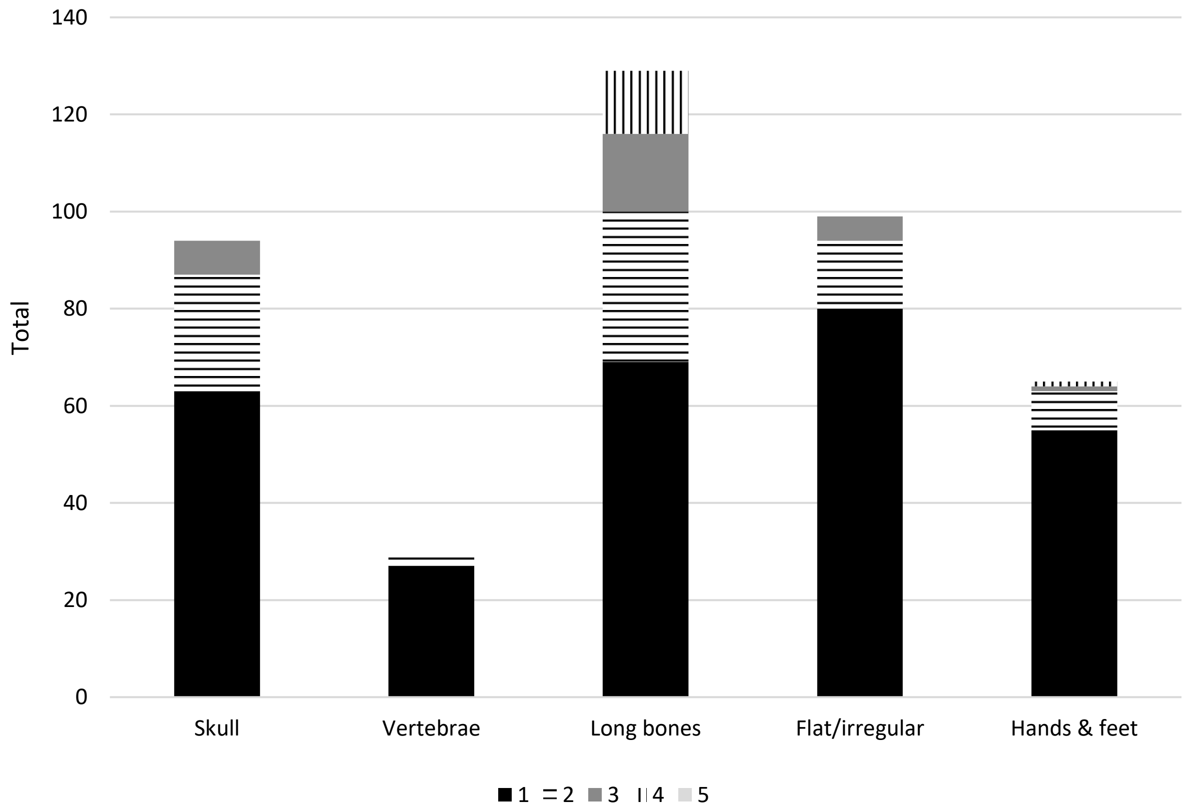


Figure 7.90: Abrasion and erosion scores divided by bone type in (595).

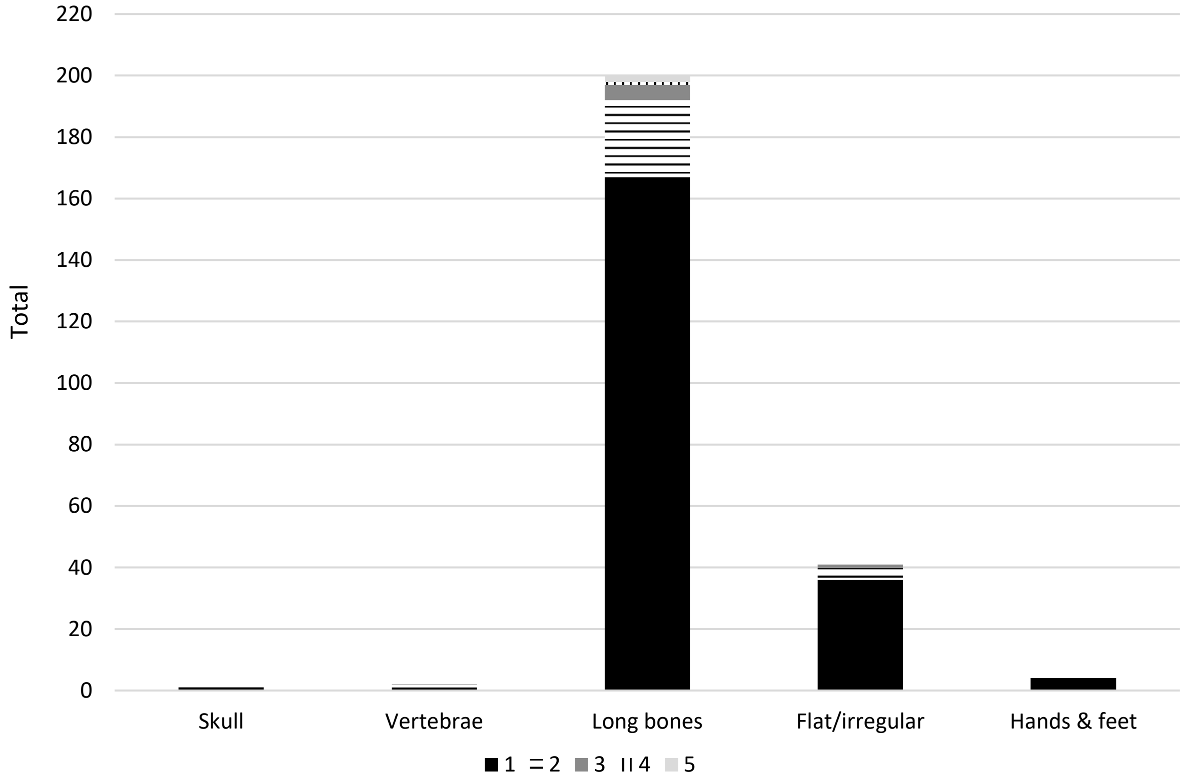


Figure 7.91: Abrasion and erosion scores divided by bone type in (656).

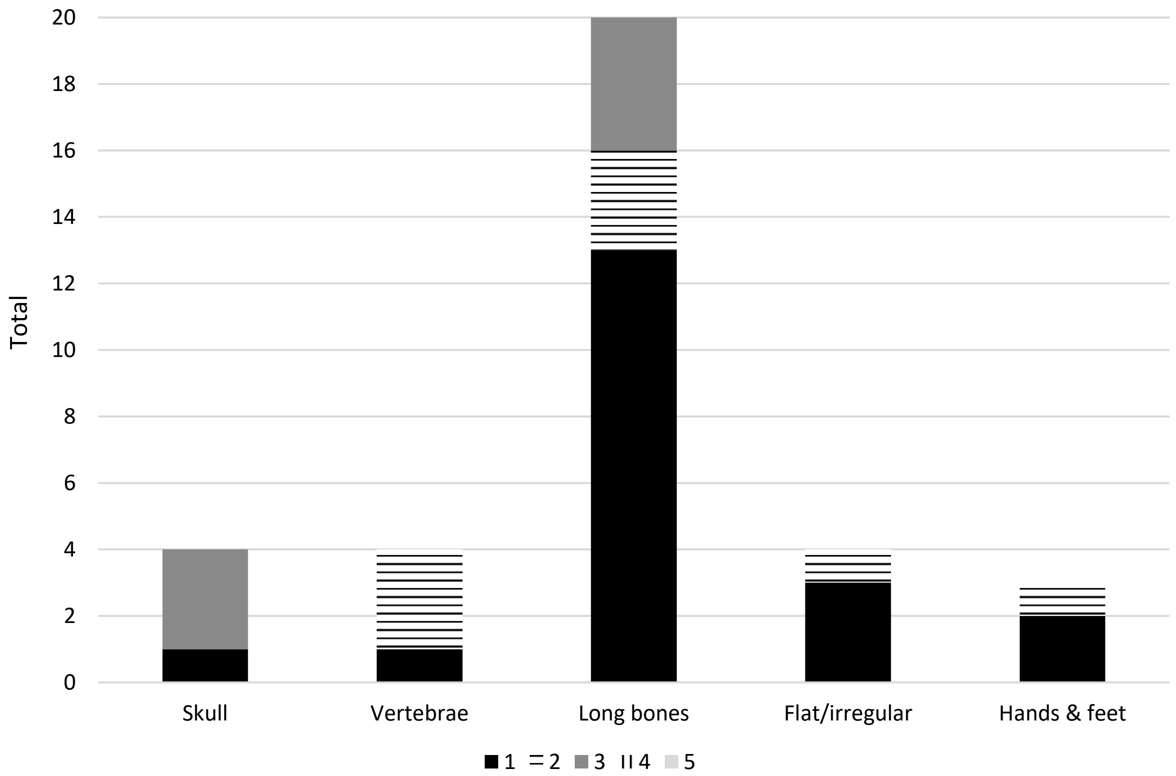


Figure 7.92: Abrasion and erosion scores divided by bone type in (734).

7.6.2.5 Discolouration

Discolouration and concretion were observed on 8.4% of the sample. Of 242 affected fragments, 17% presented limestone adhesion and concretion (almost exclusively in 595), including cases where molluscs were concreted to bone. Ochre was minimal, noted on 15 fragments in (595), and one fragment each in (656) and (734). This is unusual, as ochre staining is usually prevalent in Żebbuġ and Ġgantija contexts. The remaining discoloured bones are attributed to mineral and organic staining, often alongside root etching. No burning was observed.

7.6.2.6 Articulation

In situ articulation could not be assessed in Southwest niche as excavation plans and photographs were lacking. However, prior results noted a high presence of residual elements, which may suggest disturbance of primary interments (Malone *et al.* 2009, 103).

7.6.2.7 Skeletal element representation

Element representation illustrates distinct practices in each context (Figure 7.93). At the base of one area of the Southwest niche, a thin silt layer (734) contained a small quantity of bone with a high representation of skull fragments. Crania and mandibles represent 33.3% of the BRI, and most other elements are either absent or highly under-represented. However, some small bones and vertebral elements are present. This deposit may therefore represent highly disturbed primary interments, selective secondary deposition principally of skulls and long bones, or a mixture of both. In (656), the femur is the best-represented element (50%), followed by the humerus, tibia and fibula (25%). In the full assemblage from (656), teeth and femora produced the MNI (Stoddart, Malone *et al.* 2009, 176), indicating the selective character of the deposit. Small bones are notably under-represented. The selective pattern of element representation in these contexts supports the suggestion that heavily abraded long bones may have been moved to this area from elsewhere (see §7.6.2.4).

Context (595) presents a similar profile as the Xagħra rock-cut tomb contexts. Metatarsals are the best-represented elements (40%), followed by metacarpals (38.5%). However, femora and claviculae are also relatively well represented, and a residual signature of element representation is not strong. In the full deposit, a stronger residual signal was noted, with the atlas and scaphoid producing the highest MNI (Stoddart, Malone *et al.* 2009, 176). As discussed, complete elements were present in this deposit but *in situ* articulation cannot be assessed. Context (595) appears to represent prolonged use: it has produced the earliest radiocarbon date for the site as well as ceramics from all periods. Therefore, successive deposition and selective removals have produced a low overall element representation; as a result, those bones which are left over following selective curation are relatively well-represented.

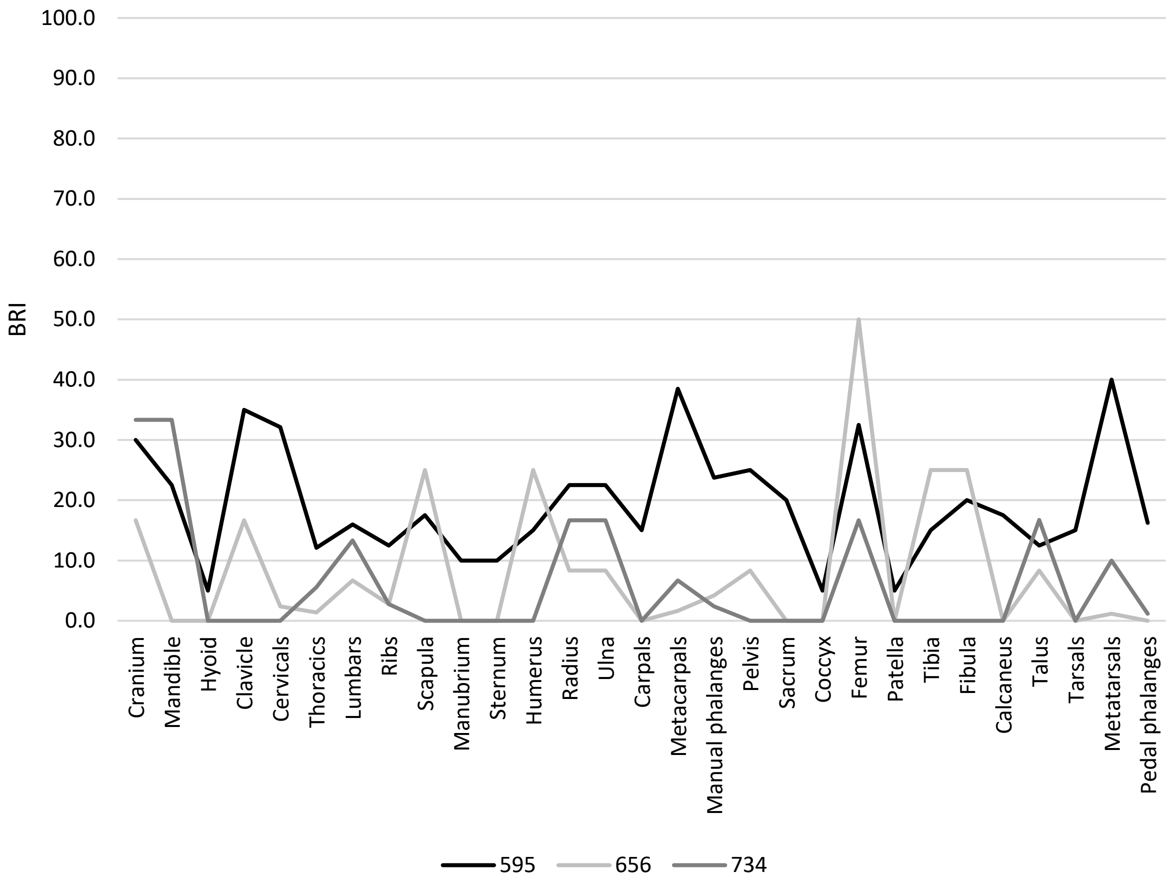


Figure 7.93: Skeletal element representation in southwest niche contexts.

7.6.2.8 Summary of the Southwest niche

Fragmentation was high in all contexts in the Southwest niche, although preservation was better in (595) (Table 7.9). Similarly, abrasion and erosion were low in (595) compared to (656) and (734). Weathering was minimal, and there was no evidence of animal damage, burning or cutmarks. This niche presented a domed roof and carefully-shaped walls delimiting a small burial area (visible in Figure 8.72 in Stoddart, Malone *et al.* 2009, 176) and is interpreted as a re-used rock-cut tomb (Malone *et al.* 2009, 103). It shares other similarities with the Xagħra rock-cut tomb, including a diverse ceramic assemblage and a weakly residual profile of element representation which demonstrates primary interments and selective bone removals. However, the relatively good preservation of bone, and the general lack of ochre staining, suggests that the original deposits were substantially mixed with later insertions. Żebbuġ ceramics in the Xagħra rock-cut tomb are now thought to have been curated for funerary use during later periods (C. Malone pers. comm.). On this basis, the single Żebbuġ date from (595) may represent a rare incorporation of older, curated bone.

Taphonomic feature	595	656	734
<5cm in size	1898 (78.6%)	332 (82.8%)	40 (74.1%)
<1/2 complete	1587 (65.7%)	327 (81.5%)	38 (70.4%)
<1/2 surface well preserved	637 (26.4%)	292 (72.8%)	36 (66.7%)
Abrasion/erosion	416 (17.2%)	248 (61.8%)	35 (64.8%)
Weathering	115 (4.8%)	13 (3.2%)	8 (14.8%)
Burning	0	0	0
Insect damage	0	0	0
Rodent gnawing	0	0	0
Cutmarks	0	0	0
MNI	20	6	3
Total analysed	2414	401	54

Table 7.9: Summary of taphonomic results from Southwest niche contexts.

7.7 Analysing skeletal element representation

SER curves from both the Xemxija Tombs and Xagħra Circle are explored below according to the main patterns they present: residuality, secondary deposition, and successive deposition (Robb 2016, 690). Residual assemblages denote primary deposition followed by selective bone removals, resulting in the over-representation of small bones. Secondary deposition is demonstrated through the over-representation of specific, usually more robust, bones, particularly crania and long bones. Lastly, SER profiles reflecting the presence of most elements, but with an overall low and uneven representation, most likely reflect the effects of successive primary depositions. The combination of natural and cultural processes which have affected the preservation of remains at both sites must be kept in mind when inferring funerary practices through element representation.

Residuality is only strongly demonstrated in the Xemxija Tombs assemblage (Figure 6.27). There is a weaker signal of residuality in the Xagħra rock-cut tombs and in context (595). As discussed in §7.3.8, both contexts analysed from the Xagħra rock-cut tomb present an over-representation of some small bones, but there is no corresponding lack of robust bones to suggest their removal. Similarly, (595) presents a mixed profile whereby both small bones and robust bones are well-represented and may demonstrate both primary and secondary practices. In the Xemxija Tombs, although bone fragmentation has contributed to their under-estimation, long bones are noticeably lacking, indicating their removal and curation.

The over-representation of specific elements is seen in numerous contexts, demonstrating secondary deposition. Cranial curation is evident in five contexts at the Xagħra Circle: (354) from the upper levels of the North bone pit, (1307), (1144) and (951) in the Deep zone, and (1024) from the Shrine (Figure 7.94). Cranial caching occurred throughout the hypogeum, but there is a repeated emphasis on their deposition throughout the Deep zone; (1307) dates to the early Tarxien, from 2930–2870 cal BC (90% probability), while (951) may have continued in use as late as 2470 cal BC (Malone *et al.* 2019). This area appears to have been used for re-deposition and careful clearance of remains from other areas of the hypogeum over several centuries. The upper levels of the North bone pit contained largely disarticulated deposits and may likewise have been formed through the removal and re-deposition of selected bones from the central space of the hypogeum. In all contexts except (354), an equal number of nonadult and adult crania were identified, suggesting curation was not just extended to adult remains.

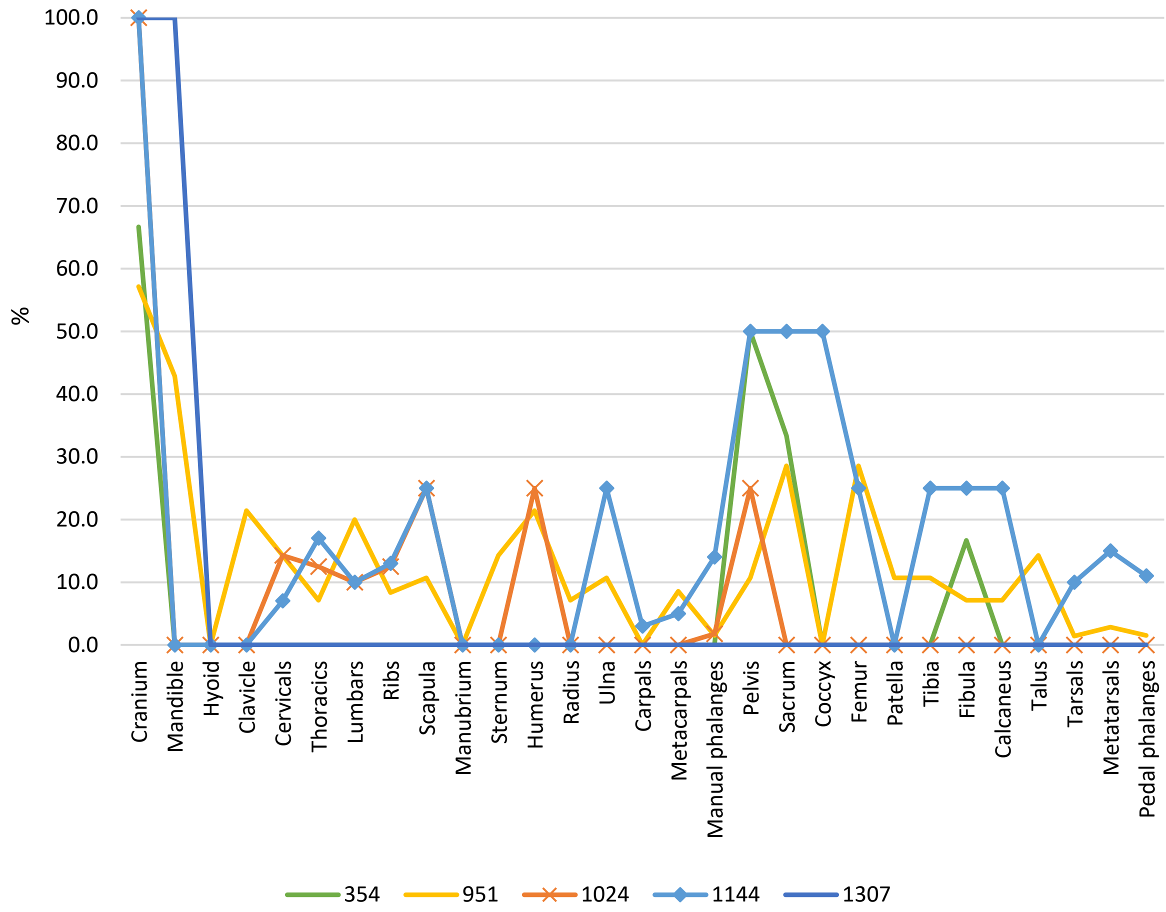


Figure 7.94: Skeletal element representation curves indicating cranial curation.

Long bones are over-represented in three contexts: (656) from the Southwest niche, and (436) and (743) from the Central pit (Figure 7.95). Femora especially appear to have been selectively re-deposited in (656), and several other long bones are represented, while small bones are largely absent. Contexts (436) and (743), however, were truncated by the cave roof collapse, resulting in their partial representation, and excavation records reveal these contexts contained primary interments rather than secondary deposits (see §7.6.1.6; Stoddart, Malone *et al.* 2009, 118, 121–122). Selective secondary deposition of long bones is therefore only reflected in (656).

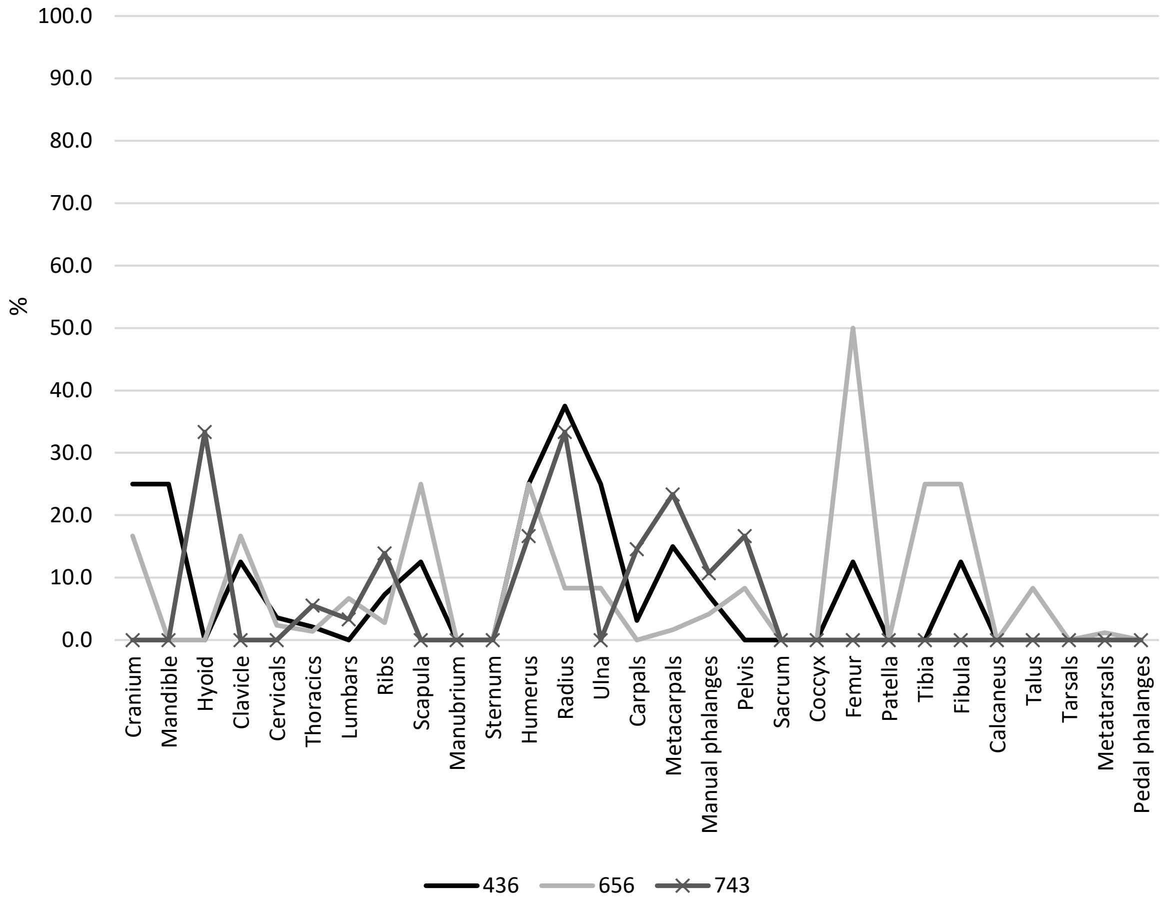


Figure 7.95: Skeletal element representation curves indicating long bone curation.

The remaining contexts from the Circle display notably uneven SER profiles. In most, nearly all elements are present, but they are often poorly represented. These can be broadly divided into two groups, based upon similarities in their SER curves. The first group presents much lower overall element representation and includes contexts from the Xagħra rock-cut tomb, (595) and (734) from the Southwest niche, and (960) from the Shrine (Figure 7.96). In these contexts, claviculae are well-represented and there is an overlapping pattern of representation for elements of the pectoral girdle and vertebrae. Small and friable elements such as the hyoid, carpals, coccyges and phalanges are under-represented or absent. This pattern seems to correlate with density-related attrition, compounded by successive deposition. The presence of small bones indicates primary interments, and the lack of fragile bones can be attributed to *in situ* destruction. Context (734) is slightly more difficult to categorise, as elements of the pectoral and pelvic girdles are mostly absent, as well as lower leg bones. However, the presence of some vertebrae and small bones suggests primary depositions; this area may therefore have contained both disturbed primary interments and some secondary depositions.

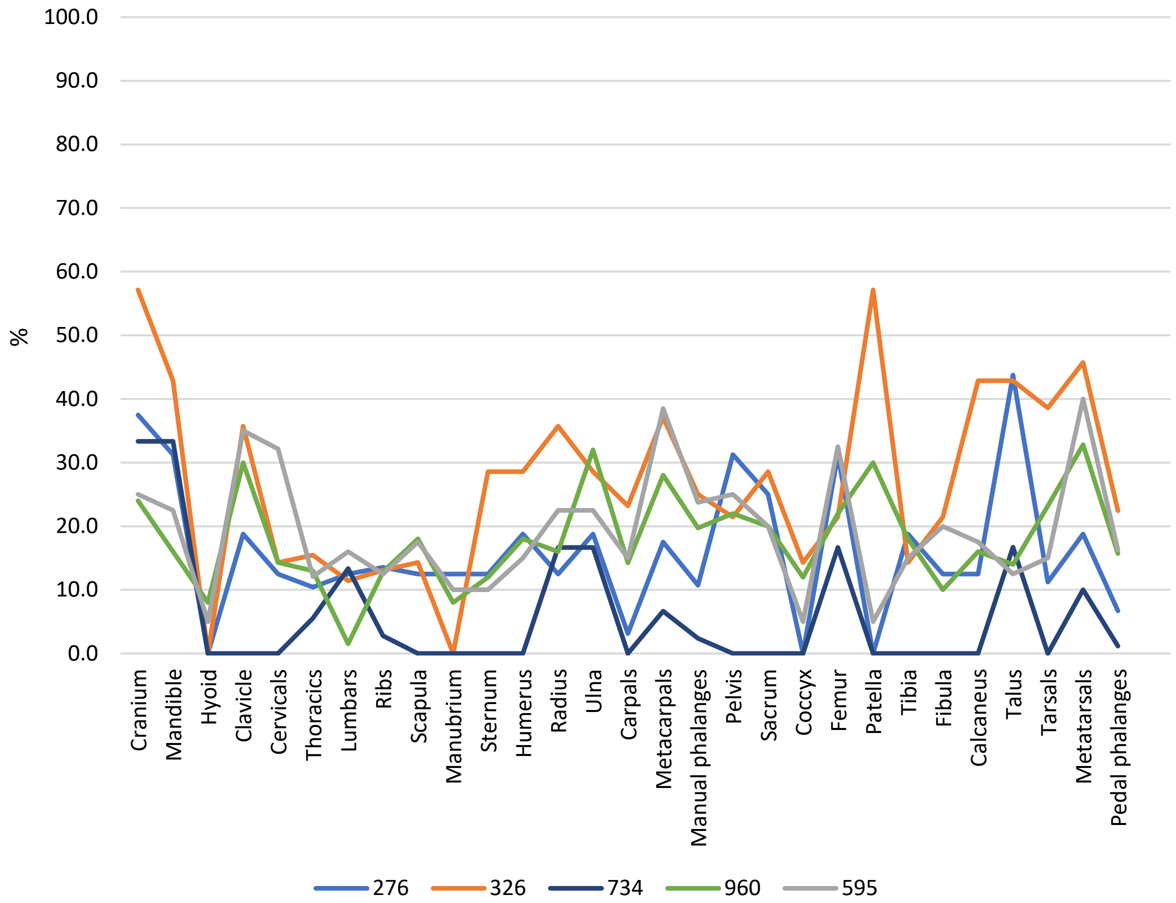


Figure 7.96: Skeletal element representation curves indicating primary successive deposition, with low overall element representation.

The second group presents generally higher overall element representation, with some distinctions between each context (Figure 7.97). In (799), from the base of North bone pit, (783) from the Display zone, and (1206) from the Shrine, nearly all elements are present. Viewed alongside the taphonomic and contextual data (see §7.4, §7.5.2 and §7.5.3), these profiles predominantly indicate primary deposition alongside alternative funerary practices. For example, (799) contains a male adult inhumation surrounded by secondary deposits of disarticulated remains, which are likely responsible for the over-representation of mandibles, *os coxae* and fibulae. Inhumation dominates in (783), although many individuals were disarticulated and rearranged. These cultural practices, alongside successive deposition, have suppressed the representation of more robust bones. Similarly, selective removals from articulated individuals are indicated in (1206), responsible for the lower number of lower limb bones. The successive deposition and disturbance of primary interments has resulted in a mixed profile of element representation in these contexts.

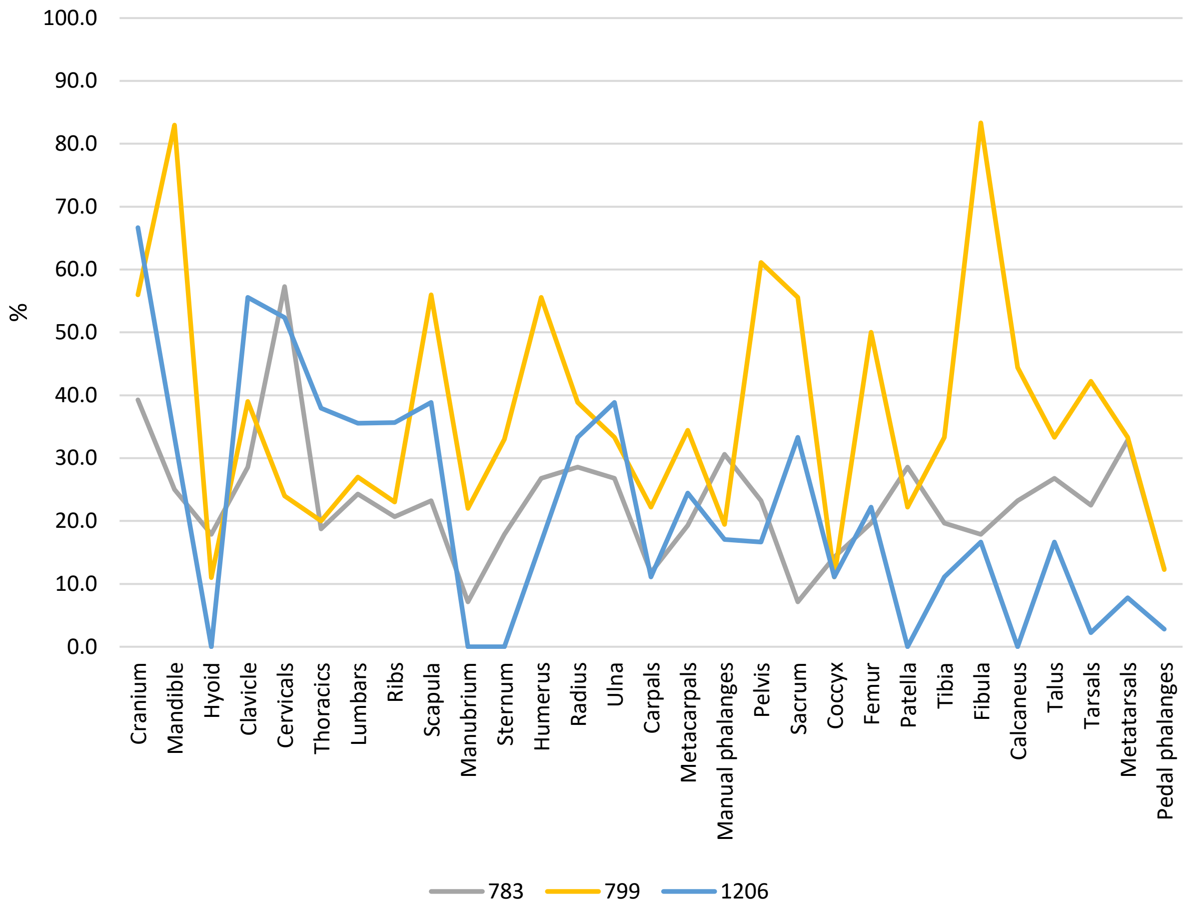


Figure 7.97: Skeletal element representation curves indicating primary successive deposition, with higher overall element representation.

The original analysis of the Xagħra assemblage identified a similar MNI from a range of elements in (783), (799), (960), (1206) and (595), deeming these contexts 'anatomically correct' in composition (Stoddart, Barber *et al.* 2009, 320). As the SER profiles indicate, primary deposition predominates in these areas, but the representation of elements varies according to a range of post-depositional factors. At the base of the Southwest niche, (595) is a highly disturbed deposit which likely contained rearranged primary interments (see §7.6.2). In the remaining contexts, primary deposition is again the dominant practice, but selective bone removals and redistribution, occasionally alongside secondary re-deposition, reveals some distinctions in each area.

In summary, secondary practices including the removal of specific bones, and their curation and deposition, are indicated through both residual element representation curves (Xemxija) and selective curation (354, 656, 951, 1024, 1144, 1307). However, deposits representing multiple or prolonged sequences of funerary practices are more challenging to interpret, particularly when extensive commingling has occurred. At Xagħra, element representation profiles in which most bones are present, but are unpredictably and unevenly represented, correlate with successive deposition of primary, often subsequently disturbed, interments. This finding may be applicable to other commingled deposits which are lacking contextual and spatial information, suggesting that uneven SER profiles signal multiple funerary rites which have not strongly biased the representation of any specific elements.

7.7.1 Comparison with Roman, Medieval and post-Medieval cemeteries

The effects of successive deposition alongside cultural manipulation can be examined through comparison with cemetery sites, where taphonomic factors are mostly attributed to natural degradation. At West Tenter Street, Spitalfields and Wharram Percy, primary inhumation was the dominant mode of interment (Bello and Andrews 2006; Mays 2007; Waldron 1987). These comparative sites display good overall levels of element representation due to the lack of cultural disturbance (Figure 7.98).

Natural taphonomic degradation is apparent through the under-representation of the sternum, carpals, sacrum, patellae and tarsals. While destruction due to the intrinsic properties of bone is evident at the Circle, it appears less pronounced than at comparative cemetery sites, as most elements are under-represented due to breakage. Although successive deposition and fragmentation has affected quantification, some distinctions are clear. In (783), cervical vertebrae are over-represented,[6] while ulnae and patellae are well-preserved in (960). West Tenter Street and (799) present a largely similar pattern, but the lower numbers of vertebrae and over-representation of fibulae in (799) stand out. The lack of vertebrae suggests fewer primary interments, and emphasis on long bones indicates their secondary deposition. Interestingly, at West Tenter Street and Wharram Percy, the lower limbs appear to be slightly under-represented compared to the upper limbs, suggesting their higher susceptibility to the effects of natural destruction. The reverse is evident in (1206), where lower arm bones are absent despite the prevalence of scapulae and humeri, indicating cultural selection.

Deviation from the baseline provided by these cemetery sites illustrates the effects of cultural practices of disarticulation and redistribution. While deposits from the Xagħra Circle have been highly affected by fragmentation, the signature of natural destruction largely conforms to that evident at primary interment sites. This supports the interpretation of primary interments which have been later disturbed through cultural practice and fragmented due to successive deposits.[7] Context (799) is distinct from the other contexts discussed here, supporting the assertion that it contained more secondary than primary interments.

[6] It is worth noting that the (783) sample comprised many nonadults in whom the cervical vertebrae were often not fully fused and, as a result, were relatively well-preserved.

[7] Furthermore, analysing the preservation of elements according to zones, Crozier (2018, 101) has found similar patterns across bones from Neolithic Orcadian tombs, Medieval and post-Medieval cemetery sites, revealing that the effects of natural destruction are similar in single graves and tombs subject to successive deposition.

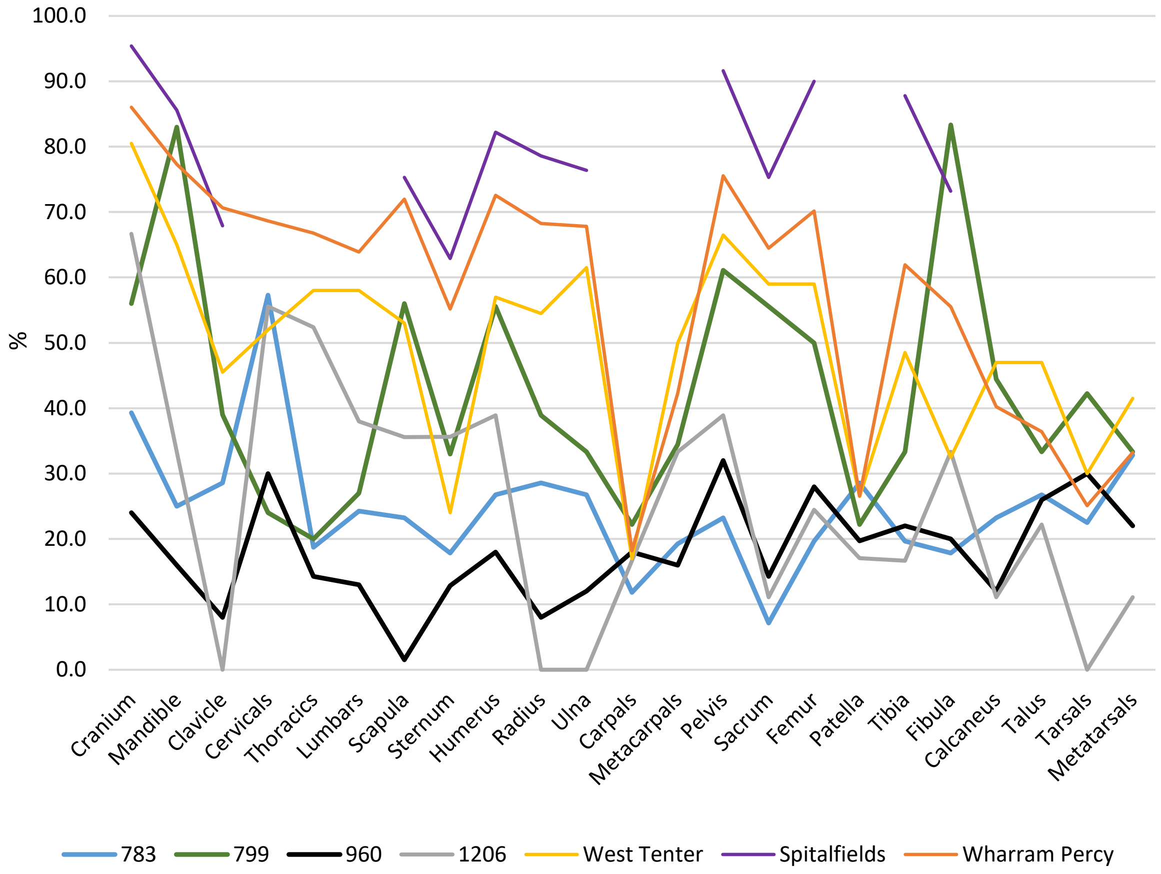


Figure 7.98: Xagħra successive deposition contexts compared to Roman and Medieval sites.

7.7.2 Comparison with other multiple burial sites

Exploring funerary practices further, selected contexts from Xagħra and Xemxija are compared to other multiple burial sites with known or inferred taphonomic histories (described in §5.5.2.1). All rock-cut tomb contexts are compared to Nanjemoy, an ossuary pit containing secondary depositions, Scaloria Cave, used for the secondary deposition and processing of complete and partial bodies, and Tinkinswood, a tomb containing disturbed primary interments (Figure 7.99). In both (276) and (326) from the Xagħra rock-cut tomb, there are similarities with Tinkinswood, where high fragmentation has resulted in the under-representation of many elements (Thompson 2019). The Scaloria Cave assemblage contained an over-representation of crania and long bones, and small bones are conspicuous by their near absence (Robb *et al.* 2015). This signature of secondary deposition is supported by cutmarks on 5.5% of the bones, demonstrating the processing of remains. Variable element presence at Nanjemoy is also an artefact of secondary deposition, illustrated by the low number of hand and feet bones (Ubelaker 1974). The presence of small bones in the rock-cut tombs is somewhat amplified due to high fragmentation of other elements, but taphonomic evidence only suggests occasional exposure at Xemxija. In contrast to the clear distinctions between fragile and robust bones at Scaloria and

Nanjemoy, element representation is much more even in the Xagħra rock-cut tombs, and small bones are over-represented at Xemxija owing to selective bone removals. As such, the predominance of primary deposition in the Maltese rock-cut tombs is emphasised when viewed alongside other multiple burial sites. The destructive effects of successive deposition and fragmentation in these environments are particularly evident.

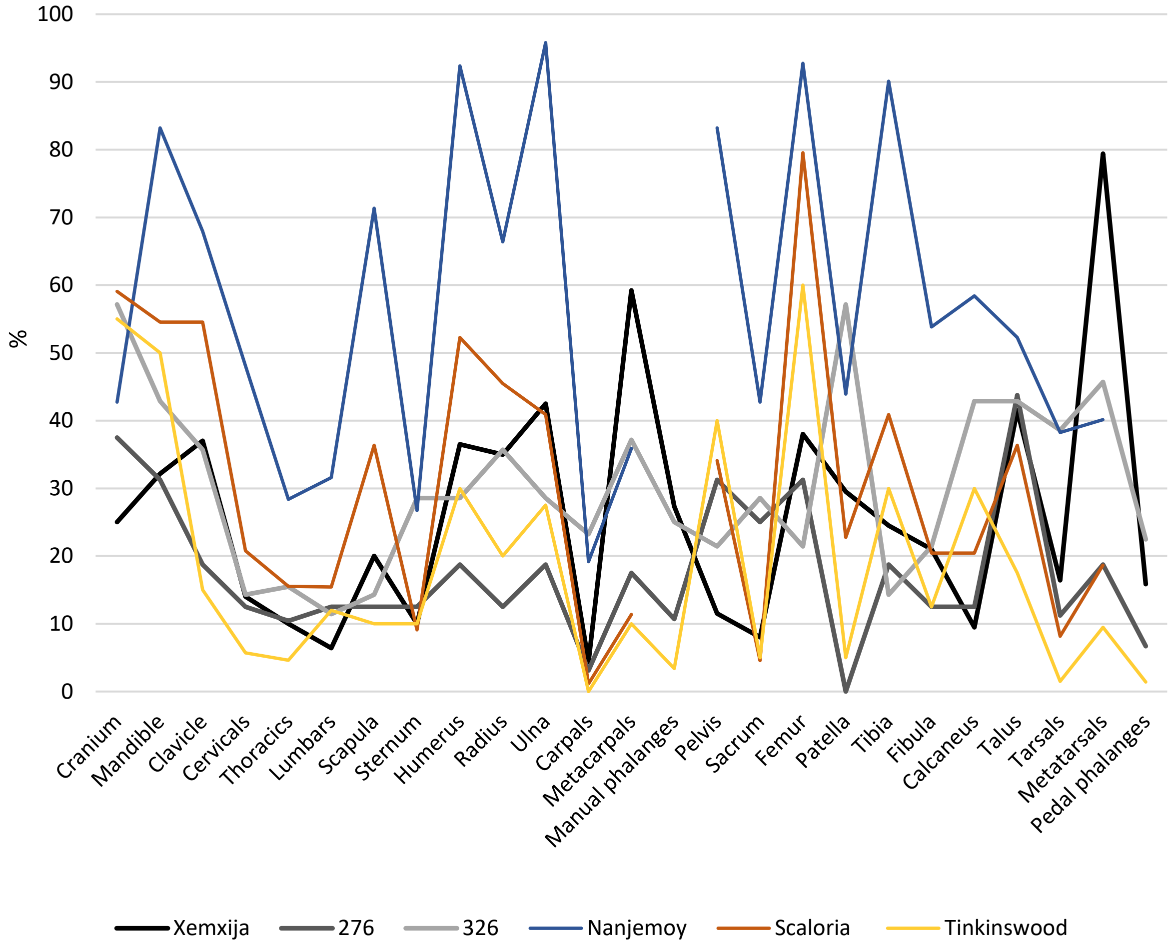


Figure 7.99 Rock-cut tomb contexts compared to multiple burial sites.

Contexts demonstrating successive deposition, disturbance, and mixed practices (particularly (783), (799), (960) and (1206)) also appear distinct from other Neolithic multiple burial sites. A similar pattern of the under-representation of friable elements—notably the sternum, carpals and pedal phalanges—is the only similarity across all sites (Figures 7.100–7.101). Contexts (783) and (960) display more even, but lower, element representation than Poulawack, Parknabinnia and Quanterness (Figure 7.100; Beckett 2011; Crozier 2018). In both contexts, a high MNI was identified from a subsample of the full assemblage (MNI=28 in (783) and 25 in (960)), suggesting that a larger sample would raise element representation. From the North bone pit, (799) presents an uneven pattern, and is comparable to Scaloria Cave, where deposition similarly included whole and partial bodies (Figure 7.101). In (1206), the fair representation of axial elements is comparable to Quanterness, although most other elements are under-represented. Successive deposition is indicated at Poulawack, Parknabinnia and Quanterness but these sites were in use for shorter periods than Xemxija and Xagħra. The main distinction between the Maltese and European sites is the low numbers of all elements in the former; this can be attributed both to sample sizes (in the case of many contexts from Xagħra) and the process of successive deposition on the scale of centuries, rather than generations.

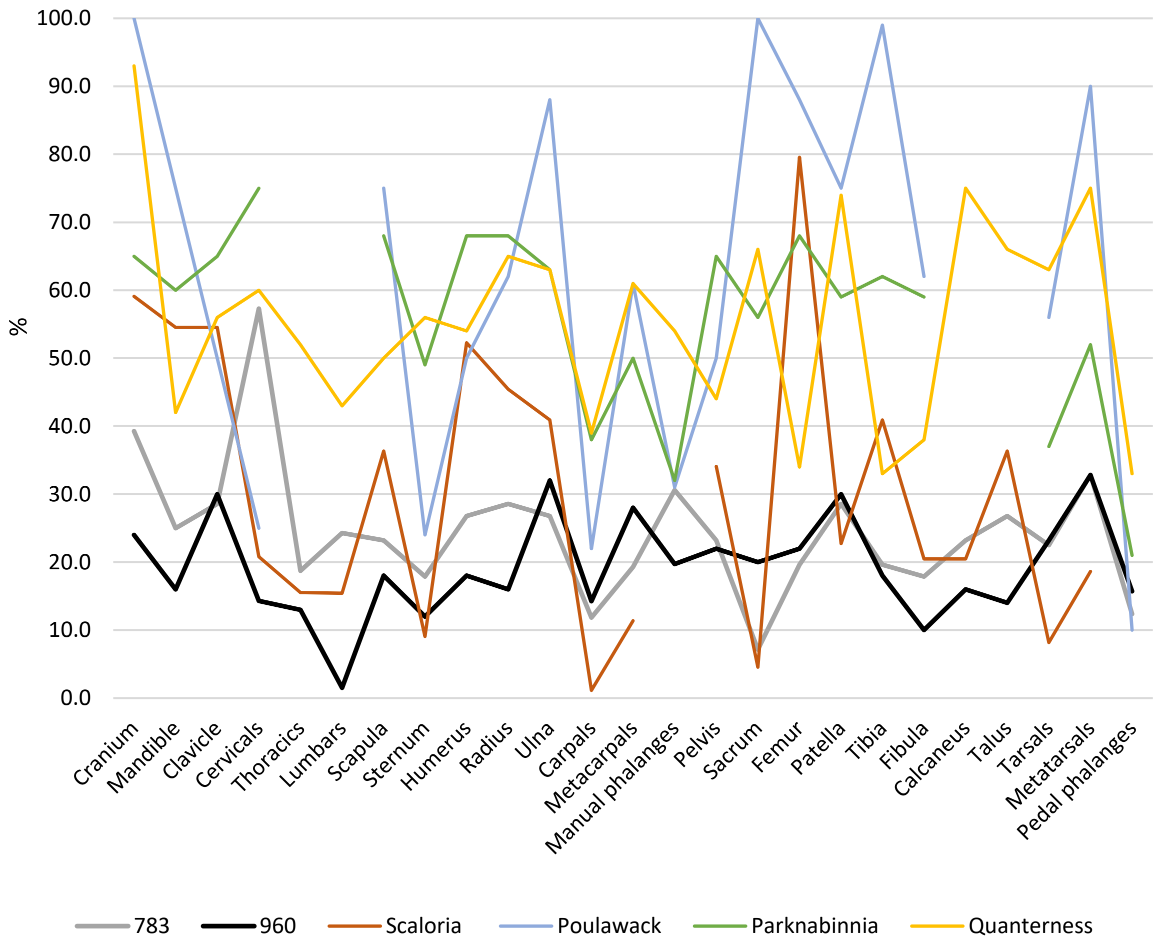


Figure 7.100: Xagħra successive deposition contexts compared to multiple burial sites.

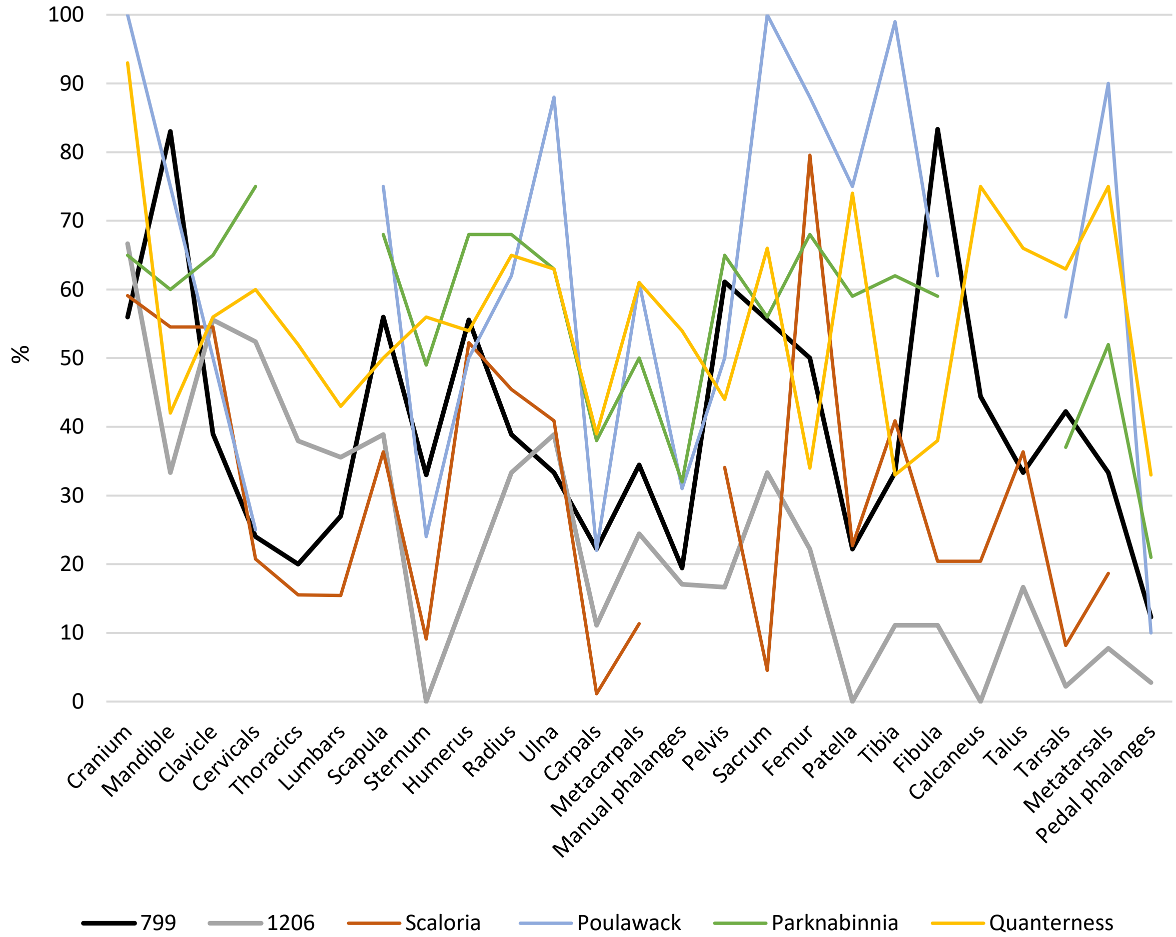


Figure 7.101: Xagħra successive deposition contexts compared to multiple burial sites.

7.7.3 Cluster analysis of element representation

Cluster analysis was implemented to statistically examine the relationships between the Maltese data and comparative multiple burial sites, based on element representation. This provides both a novel methodological exploration, as statistical analysis removes some of the subjective bias inherent in the interpretation of SER curves. As various methods of clustering return slightly different results (Aldenderfer and Blashfield 1984, 15), several methods were utilised. Cluster analysis was first carried out on sites with known or inferred practices as a means of 'ground truthing' the method. All contexts included in this research were then analysed, and clustering was also tested within the groups of contexts outlined above, to identify key patterns within the data. Finally, key Maltese SER data were analysed alongside the comparative sites.

7.7.3.1 Comparative sites

Cluster analysis of comparative sites with a range of depositional modes was implemented using single linkage, average linkage and Ward's method. Single linkage identified clusters at the furthest distance and separated Quanterness from the two main clusters (Appendix 4.2). Average linkage between and within groups returned similar clusters (Figure 7.102), grouping Wharram Percy and West Tenter Street at a close distance, and Nanjemoy and Quanterness at a slightly greater distance. Although the latter two represent secondary deposition and successive deposition respectively, they both present good average element representation, likely responsible for their inclusion in this cluster. The second cluster comprises Tinkinswood and Scaloria at a close distance, and, at a further distance, Kunji Cave and Non Pa Wai. This group includes sites presenting successive deposition as well as selective secondary practices, and the more uneven and lower average element representation across these sites has been identified as statistically comparable. Ward's method returned the same clusters as average linkage, with relationships noted at a closer distance (Appendix 4.2.1).

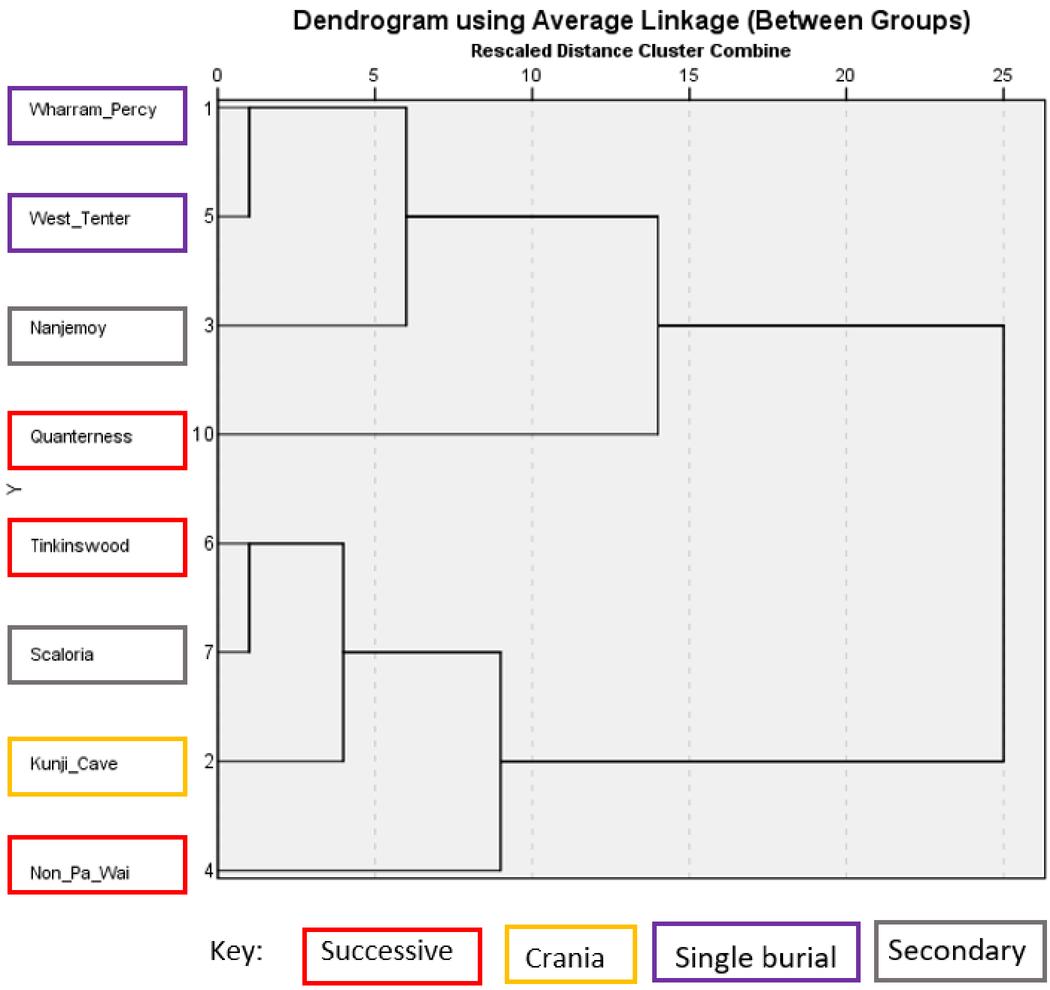


Figure 7.102: Cluster analysis of comparative sites using average linkage between groups.

The groups returned through cluster analysis do not always accord with similarities in funerary practices. Sites across both clusters contained primary interments which were subject to sequential depositions and disturbance, but which produced different levels of element representation according to varied taphonomic factors. This statistical method cannot distinguish between natural and cultural taphonomic processes but is useful at a broad level for discerning the extent of disturbance or degradation of remains. Generally, but not always, greater disturbance correlates with selective cultural practices.

7.7.3.2 Maltese data

Cluster analysis of all Maltese contexts sampled in this study was carried out. As expected, single linkage created a chain of contexts and did not return clear groupings (Appendix 4.2.2). Contexts (799) and (1144) were found to be distinct and only grouped with the other contexts at a distance. The closest groupings were found between (595) and (960), and (1307), (734) and (436)—while the latter mostly represent secondary deposition, they were not linked through examination of SER, above. Average linkage both within and between groups returned similar results (Appendix 4.2.2), again separating (799) and (1144) from the main clusters. Two distinct clusters emerged, which largely grouped residual and successive contexts (although 951 was also included) together, and secondary deposition/curation contexts (Although 734 was included in this cluster). Ward's linkage returned the clearest clusters: one containing mostly residual and successive deposits, and another containing mostly curation contexts (Figure 7.103). Again, context (951) is grouped with successive deposits, as the prevalence of crania is less amplified than in other curation contexts. Xemxija is grouped with contexts reflecting successive deposition, revealing similarities between both sites and comparable element representation across many contexts. Contexts (799) and (1144) are clustered with this group at a greater distance, perhaps reflecting their higher composition of secondary deposits.

Within each group of contexts (cranial curation, over-representation of long bones, and successive deposition), Ward's method was used to assess any significant patterns in element representation. Within cranial curation contexts, the representation of crania was correctly identified as dissimilar to all other elements, clustering at a farther distance (Figure 7.104). Approximately four clusters were identified within limb curation contexts, including all small bones in two clusters and long bones in another two clusters; the long bones were grouped with the clavicle, scapula, cranium and mandible, elements which were relatively prevalent (Appendix 4.2.2). Within successive deposition contexts, two broad clusters were identified, separating small and friable elements (with low representation) from more robust elements, although this latter group also contained the pectoral and pelvic girdles, metacarpals and foot bones (Appendix 4.2.2). These elements were all well-represented due to the predominance of primary interment.

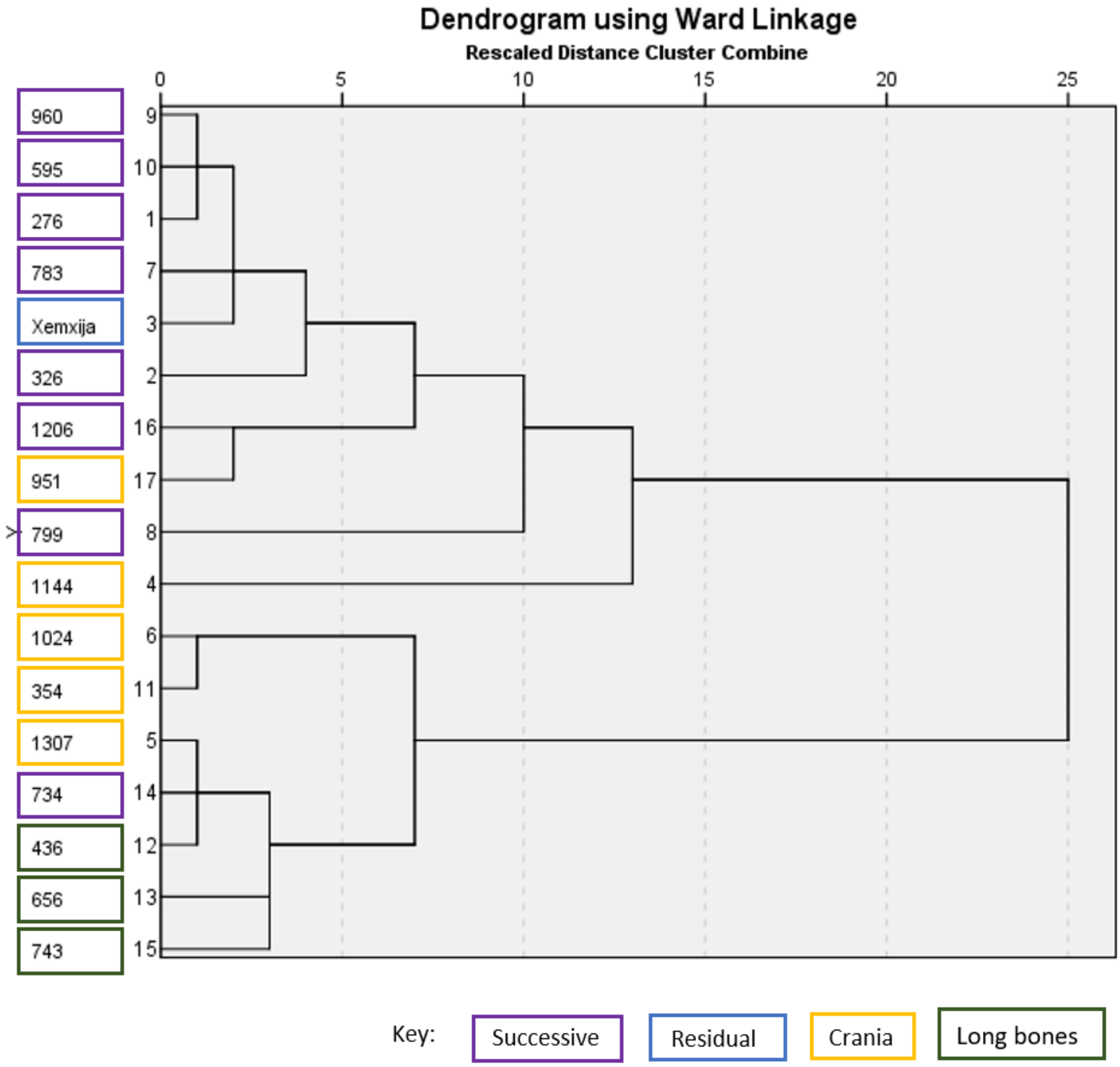


Figure 7.103: Cluster analysis of all contexts using Ward's method.

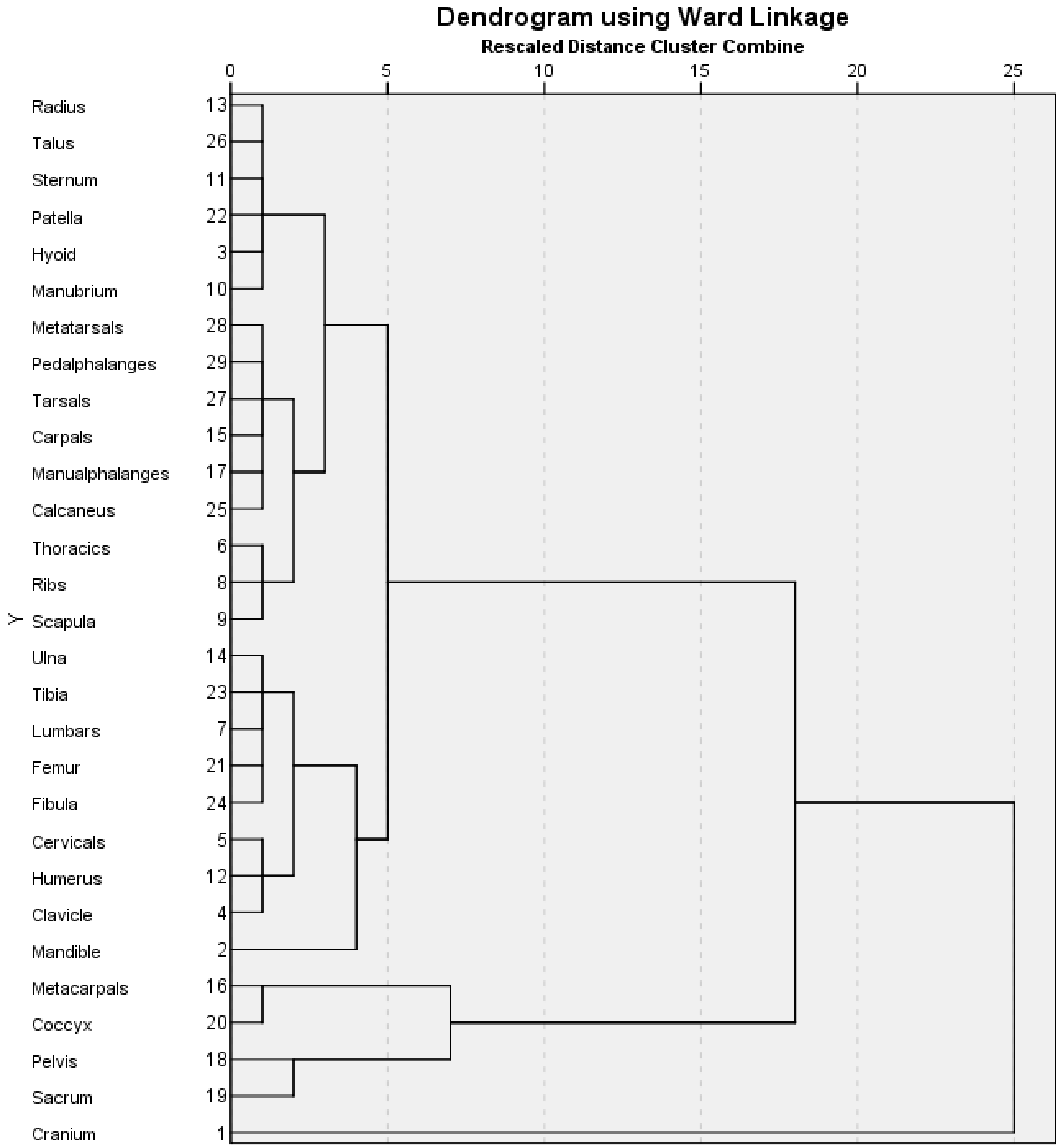


Figure 7.104: Cluster analysis of all cranial curation contexts using Ward's method (354, 951, 1024, 1144, 1307).

Several key contexts were analysed alongside the comparative sites: Xemxija, representing the only strong residual signature, (354) and (655) as curation deposits, (960) and (783) as strongly representing successive deposition, and (799) as comprising both primary and secondary interments (Figure 7.105). As discussed above, cluster analysis mostly distinguished between sites representing predominantly primary and secondary practices based on patterns in element representation. When analysed alongside the Maltese data, three clusters at a close distance were returned (Figure 7.105). The first cluster included (783), (960) and Xemxija linked, at a slight distance, to Non Pa Wai and, at a greater distance, to (354) and (656). The first three Maltese contexts continue to be significantly similar to each other and dissimilar to most comparative sites. Non Pa Wai, likely representing an *ad hoc* secondary deposit of residual bones (J. Robb pers. comm.) is therefore most like the two clearly selective deposits, (354) and (656), which display low numbers of most elements. Context (799) was clustered with sites containing predominantly primary interments, placed at a slight distance from the cemeteries of Wharram Percy and West Tenter Street, and linked with Nanjemoy and Quanterness. Both latter sites have an under-representation of small and friable bones and demonstrate the effects of successive deposition. The link between these sites and (799) may be attributed to higher element representation in (799) compared to many other Maltese contexts. Context (951) was clustered with Tinkinswood, Kunji Cave and Scaloria Cave, all of which contained highly disturbed deposits and, in some cases, both primary and secondary depositions. This accords closely with the inferred practices in (951), where crania and long bones predominate but small bones suggest at least some complete interments.

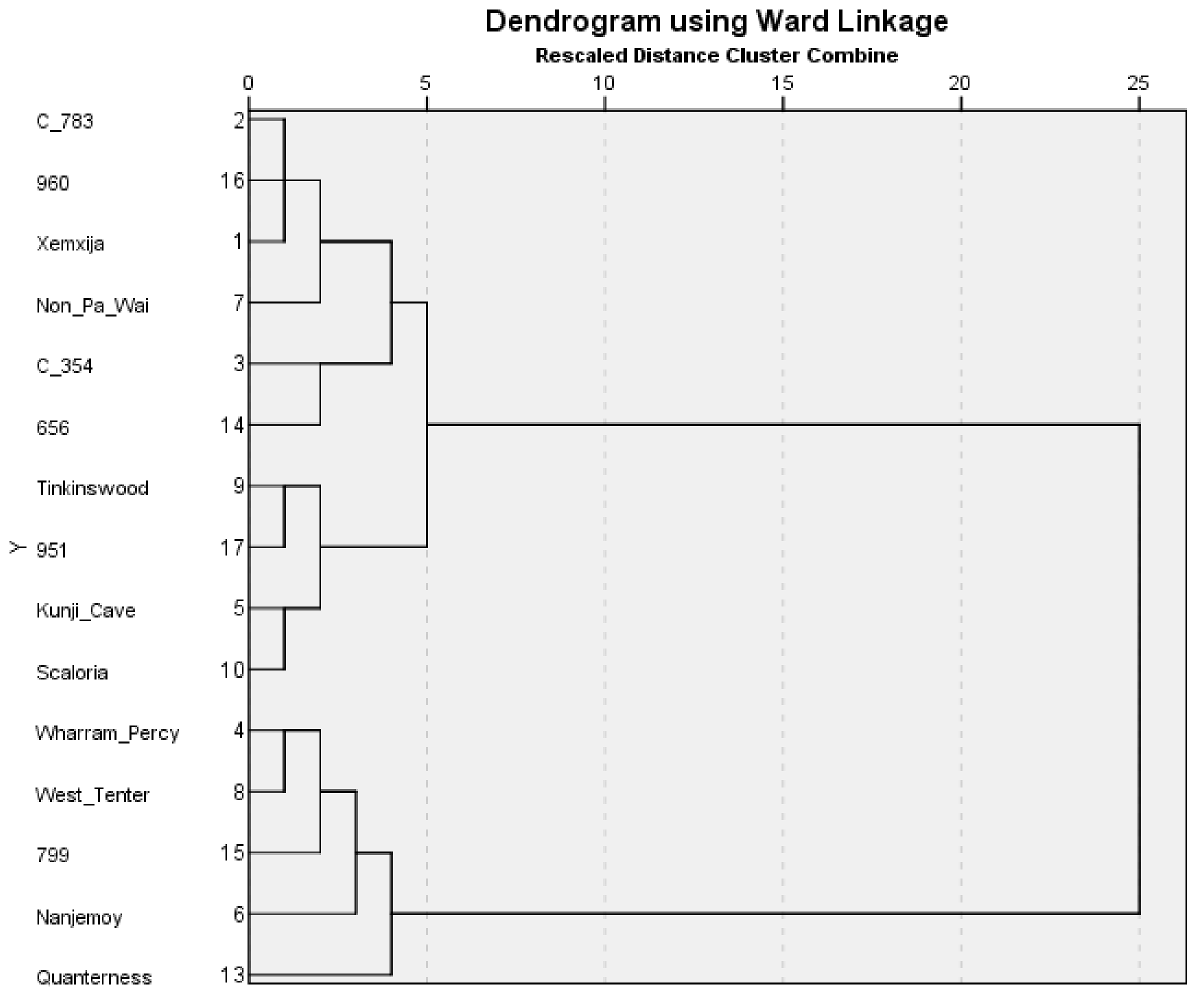


Figure 7.105: Cluster analysis of key Maltese sites/ contexts with comparative sites.

Cluster analysis cannot identify and distinguish between sites exposed to only natural degradation, or both natural and cultural processes. In the case of these comparative sites, however, cultural practices are mostly responsible for biased SER profiles. Clustering reflects this principle, grouping sites with higher element representation and therefore generally less cultural disturbance, and sites with lower element representation which accords with greater cultural manipulation. This method can therefore provide a useful way to explore patterns in element representation data across numerous sites and draw out the key trends.

Comparing the Maltese data to a series of multiple burial sites reveals that, broadly speaking, contexts with similar funerary practices have statistically similar SER profiles. This analysis reveals some distinctions, however, including less strong cranial curation signatures in (951) and (1144), suggesting these contexts represent a mixture of practices. Some of the assumptions regarding classifications of the Xagħra contexts are borne out. Interestingly, successive deposition profiles are dissimilar to most comparative sites, and this may be the most significant finding of the cluster analysis. In these contexts, even though the presence of all elements and the *in situ* articulation of labile joints discloses the practice of primary inhumation, the combination of extensive natural and cultural disturbance appears to be somewhat unique to the Maltese sites, which were in use for much longer than most other Neolithic and Copper Age collective deposition sites.

7.8 Funerary practices at the Xagħra Circle

Overall, the taphonomic and SER results demonstrate some distinctions in funerary practices between discrete burial spaces (Table 7.10). The mean API shows higher element completeness in three areas: the Display zone, Shrine and Southwest niche. QBI results are more varied, revealing the diverse agents responsible for cortical surface modification. The poorest levels of preservation are seen in the rock-cut tomb (94.5% <1/2 well-preserved), according with previous accounts for the friability of bone, sediment concretion and ochre staining (Duhig in Malone *et al.* 1995, 337). Preservation is best in the Shrine (18.3% <1/2 well-preserved), where successive primary interments were disturbed but overall levels of disarticulation are lower.

Fragmentation overwhelmingly showed dry bone breakage, with only six fragments (from the Deep zone, Southwest niche and Shrine) displaying fresh bone breakage. Abrasion and erosion were highest in the Southwest niche (24.4%) and lowest in the Deep zone (6.3%). The most extensive abrasion and erosion was observed in the rock-cut tomb, the Southwest niche and the Deep zone, attributed to root etching, as well as disturbance, tumbling, and perhaps even trampling. Weathering was most prevalent in the rock-cut tomb (16.6%), followed by the Deep zone (13.1%), but is likely due to inundation and compaction rather than exposure. Burning was present on a small number of remains in the rock-cut tomb, Display zone and Shrine, consistent with incomplete charring. This has not been discussed in previous analyses (cf. Stoddart, Barber *et al.* 2009). Virtual approximation of the hypogeum has demonstrated that it would have largely been experienced as a dark space (Barratt *et al.* 2018). Lamps and torches would have been necessary to ensure visibility within the hypogeum and open flames could have scorched nearby bones. In contrast to the Xemxija Tombs, only one example of rodent gnawing was observed, on a perinatal femur from (951), but is not included in this study (R. K. Power pers. comm). Dermestid beetle bores and pits were identified in the rock-cut tomb and North bone pit (799).

Preservation is best in the Display zone and the Shrine, both in the centre of the hypogeum and dating to the Tarxien phase. Remains in the re-used and disturbed Southwest niche are relatively well-preserved; thus, the main indicator of disturbance in this area is the single Żebbuġ radiocarbon date and the varied ceramic assemblage. Preservation is poor in the rock-cut tomb, akin to the Xemxija Tombs, suggesting a characteristic taphonomic signature for these sites, due to successive deposition and disturbance of remains in a small space over multiple generations. Many elements are highly fragmented, but element completeness is slightly better at Xagħra (Figure 7.106) compared to Xemxija (Figure 6.5, §6.3.1). Bone preservation is also better, with more fragments presenting good cortical preservation, and some fully preserved (Figure 7.107, compare to Figure 6.6).

Several lines of analysis reveal primary deposition to be the dominant mode of deposition. Dermestid beetle boring may indicate a short period of sub-aerial exposure and/or wrapping of the corpse in organic materials. Examining articulation, alongside SER, illustrates primary deposition in many areas. This research has found a recurring pattern of cranial and long bone removal, particularly in Tarxien contexts. The re-deposition of these elements is evident in at least three contexts. Firstly, the North bone pit contains a large deposit of predominantly disarticulated bone, and cranial curation is evident in (354). Secondly, (951) was formed through a long period of redepositing remains from elsewhere in the hypogeum, and a clear emphasis on crania and long bones is evident. Finally, (656) represents selective secondary deposition of crania and long bones. Following redistribution of selected bones, successive interments were made. The combined effects of natural taphonomic degradation and compaction due to overlying deposits have resulted in the low representation of elements in all contexts.

Taphonomic feature	**Xagħra rock-cut tombs** (276), (326)	**North bone pit** (354), (799)	**Display zone** (783)	**Deep zone** (951), (1144), (1307)	**Shrine** (960), (1024), (1206)	**Central pit** (436), (743)	**Southwest niche** (595), (656), (734)
<5 cm in size	84.2%	77.1%	81.1%	76.1%	81.2%	83.7%	79.1%
Mean fragment size	3.61 (SD 2.754)	3.36 (SD 3.08)	2.74 (SD 2.325)	2.83 (SD 2.27)	2.78 (SD 2.738)	2.85 (SD 2.20)	2.95 (SD 2.745)
<1/2 complete	78.2%	84.8%	71.7%	87.8%	68.6%	81.4%	68%
Mean API	1.66 (SD 1.245)	1.51 (SD 1.178)	1.93 (SD 1.407)	1.43 (SD 1.094)	2.03 (SD 1.463)	1.45 (SD 1.08)	1.91 (SD 1.438)
<1/2 well preserved	94.5%	76.5%	12.6%	41%	18.3%	85.3%	33.6%
Mean QBI	0.28 (SD 0.589)	1.01 (SD 1.472)	3.35 (SD 1.070)	2.24 (SD 1.310)	3.36 (SD 1.068)	0.99 (SD 1.18)	2.82 (SD 1.503)
Mean FFI	5.99 (SD 0.125)	5.97 (SD 0.179)	5.99 (SD 0.054)	5.8 (SD 0.926)	5.97 (SD 0.359)	6.0 (SD 0.0)	5.97 (SD 0.26)
Abrasion/ erosion	10.3%	7.4%	11.4%	6.4%	8.9%	7.6%	24.4%
Mean abrasion/ erosion	0.15 (SD 0.5)	0.08 (SD 0.288)	0.12 (SD 0.352)	0.08 (SD 0.356)	0.09 (SD 0.303)	0.08 (SD 0.26)	0.33 (SD 0.684)
Weathering	16.6%	0.3%	2.8%	13.3%	2.2%	3.9%	4.7%
Mean weathering	0.43 (SD 1.078)	0.0 (SD 0.055)	0.04 (SD 0.273)	0.22 (SD 0.583)	0.03 (SD 0.241)	0.04 (SD 0.19)	0.06 (SD 0.303)
Insect damage	0.1%	0.9%	0	0	0	0	0
Gnawing	0	0	0	0	0	0	0
Burning	0.9%	0	0.02%	0	0.1%	0	0
Cutmarks	0	0	0	0	0	0	0
SER profile	S; PD; CC (326)	SD; P (799); CC (354)	S; PD	SD; CC; PD	S; PD; CC (1024)	S; P	S; R (weak); SD; PD? (734)
Total analysed	**2083**	**2298**	**4953**	**2352**	**3912**	**355**	**2869**

Table 7.10: Overall taphonomic results according to spatial location. SER profile: P (Primary); PD (Primary Disturbed); S (Successive deposition); R (Residual); CC (Cranial Curation); SD (Secondary Deposition).

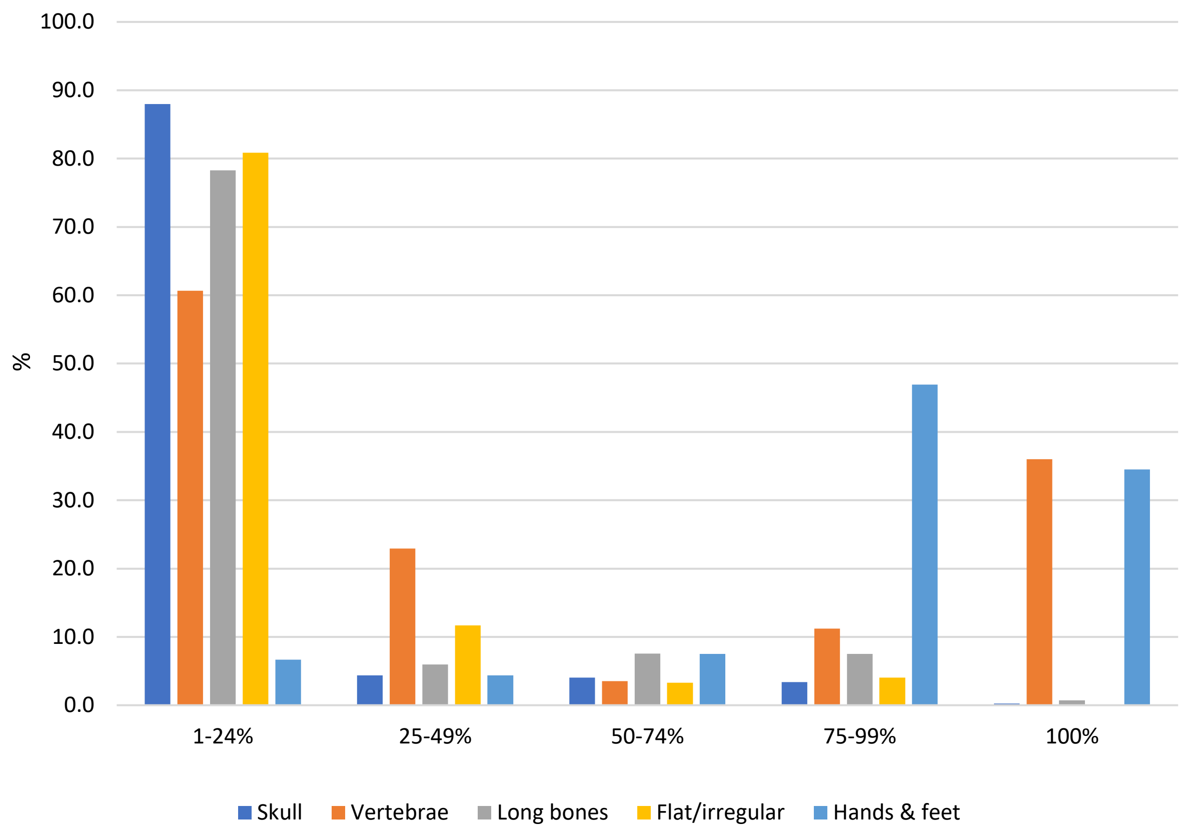


Figure 7.106: Element completeness (API) divided by bone type across the Xagħra Circle sample.

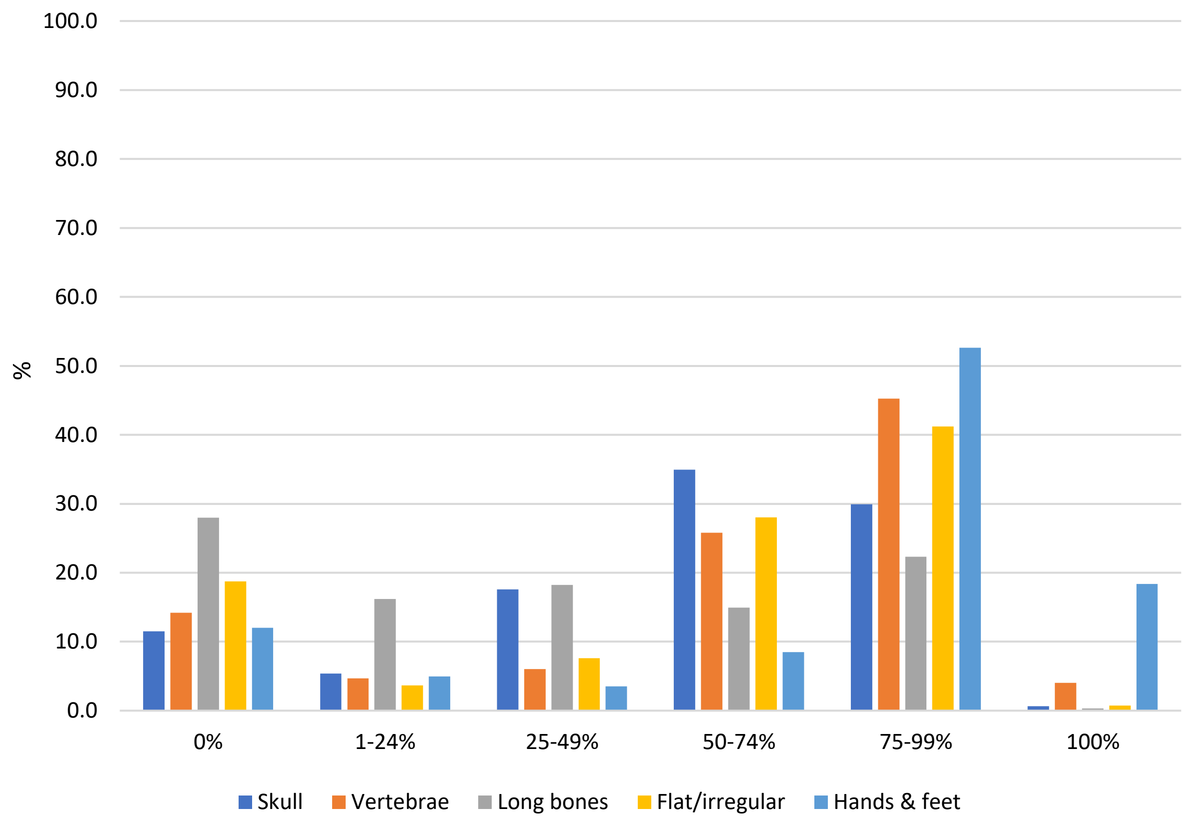


Figure 7.107: Element preservation (QBI) divided by bone type across the Xagħra Circle sample.

The usual treatment of the dead at Xagħra was therefore primary deposition followed by disarticulation, rearrangement, and/or re-deposition of selected elements (Figure 7.108). The sequential disarticulation of neonates and perinates, evidenced in (1206), children and adolescents, as seen in (783), and adults, visible across numerous site plans and photographs, demonstrates the parity of funerary treatment across individuals of all ages. That post-mortem pathways were similar for most individuals has significant implications for personhood and bodily ontologies across the life-course. Unlike at the Xemxija Tombs, there is little indication of exposure or of the presence of scavengers within the hypogeum. Indeed, the only clear difference to emerge within Xagħra is the relatively small number of individuals who were left undisturbed (although estimated at 2% in Malone and Stoddart 2009, 366, this figure has been rounded up to 10% here as more articulations have come to light through the intra-site GIS). These have often been referred to as foundational burials of male 'ancestors' (e.g. Malone and Stoddart 2009, 366; Stoddart and Malone 2015). However, the basal deposition of an older child in (783), described in §7.5.2.6, challenges this interpretation. Perhaps it was neither gender nor age which determined funerary treatment. Instead, the circumstances or timing of a person's death, or the stage of decomposition they had reached when they were revisited, might have been more central factors governing post-depositional treatment.

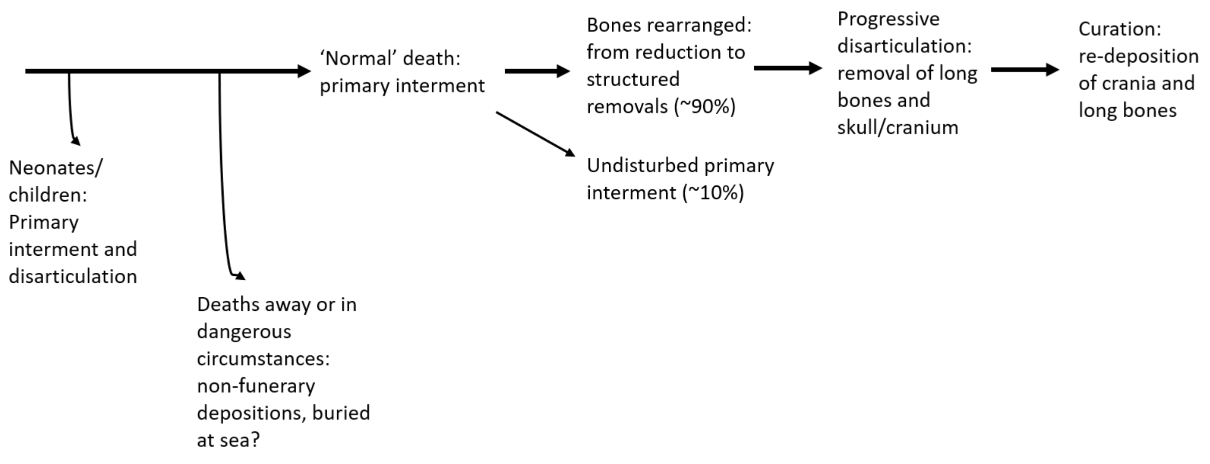


Figure 7.108: Deathways for populations around the Xagħra Circle between 3600–2300 cal BC.

The following chapter responds to the first two research questions posed in Chapter 1. Results from both sites are compared, exploring variation in the taphonomic results and summarising depositional modes in each context included in this study. Funerary practices are then examined spatially at the Xagħra Circle. The sequence of post-mortem rites illustrated through this research is brought together to consider how the process of dying was achieved in late Neolithic Malta.

CHAPTER EIGHT

DEATHWAYS IN LATE NEOLITHIC MALTA

"There is nothing like constant exposure to dead bodies to remove the trepidation attached to dead bodies."
—Caitlin Doughty, 'Smoke Gets in Your Eyes: And Other Lessons from the Crematorium' (2016, 165).

8.1 Overview

The taphonomic results from the Xemxija Tombs and Xagħra Circle, presented in Chapters 6 and 7, reveal largely similar patterns of preservation at both sites. However, some distinctions in funerary practices illustrate various ways of engaging with the dead within rock-cut tombs and hypogea. Depositional pathways at both sites were explored through element representation curves and cluster analysis in §7.7. These methods demonstrated: (1) the predominance of primary deposition in many contexts; (2) several areas with an emphasis on secondary deposition of crania and long bones; and (3) the significantly destructive effects of long-term successive deposition in the Maltese contexts, compared to other Neolithic multiple burial sites.

Below, overall taphonomic results for both sites are compared and the range of funerary practices at each summarised. At Xagħra, these practices are analysed spatially, to explore the use of the hypogeum and the relationship between internal burial spaces. Investigated chronologically, some suggestions are provided for the increasingly structured means of disarticulation discerned throughout the Tarxien phase. Bringing together the model of deathways proposed at each site (see §6.5 and §7.8), the burial process is sketched out in fuller detail in §8.5, with some inferences for pre-depositional rites, and the emotional and sensory impact of continued interactions with the dead. This reveals ways in which the life-death boundary was negotiated, and the process of social death achieved, in late Neolithic Malta. This highlights the role of the dead body, considering its changing status as it progressed through the sequence of mortuary actions uncovered through taphonomic analysis. In this context, encounters with the remains of the dead were likely familiar experiences and, as Doughty (2016) acknowledges, this is crucial for the social acceptance of death and dead bodies.

8.2 Comparing the Xemxija Tombs and Xagħra Circle

8.2.1 Completeness, preservation and fragment size

Element completeness is comparable at both sites, with >60% of the fragments analysed representing <25% of the element (Figure 8.1). Bone completeness is fractionally higher in the Xemxija Tombs assemblage, with 11.2% of the remains complete, compared to 8.3% at the Circle.

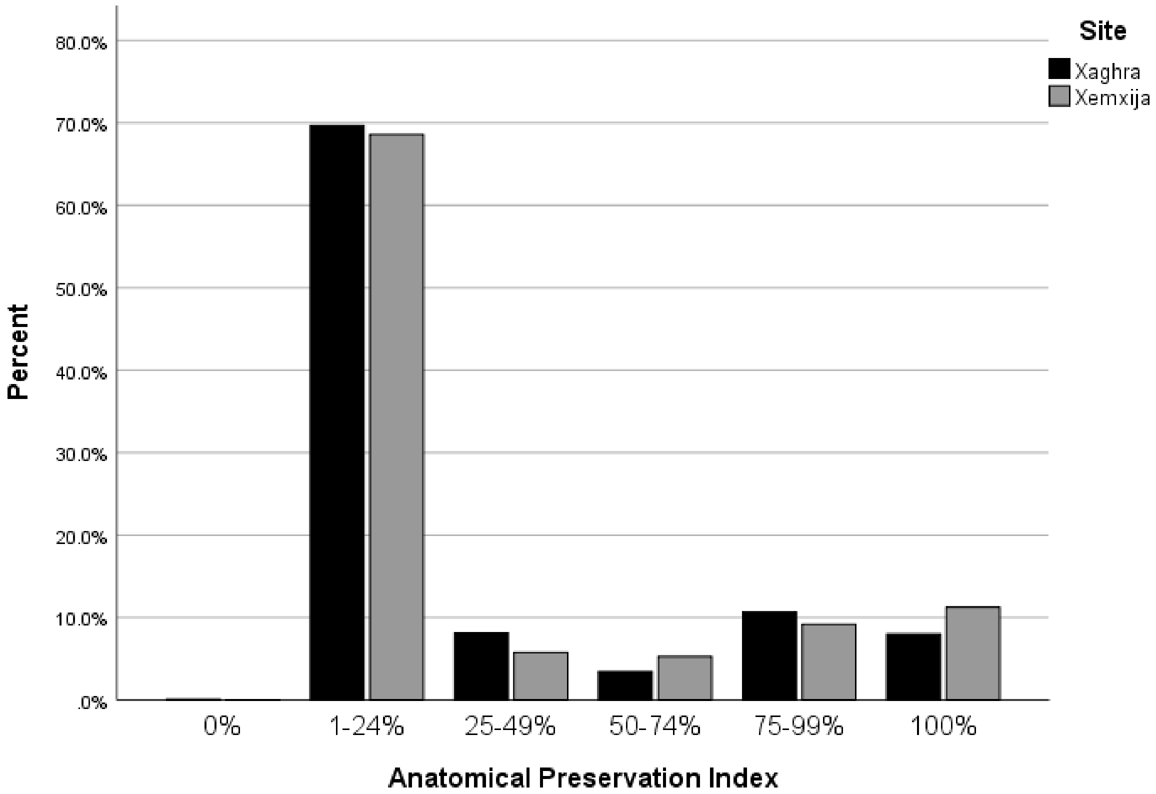


Figure 8.1: Element completeness (API) at both sites.

In contrast, element preservation is varied at both sites (Figure 8.2). Cortical preservation scores were nearly evenly spread across the indices between 1–74% for the Xemxija Tombs, while more fragments from Xagħra were either fully degraded or fully preserved. The apparently greater level of bone completeness at Xemxija may be due to full analysis of the assemblage, compared to the selective sample from the Circle. However, the higher destruction of bone surfaces at Xemxija reveals distinct pre- and post-depositional histories.

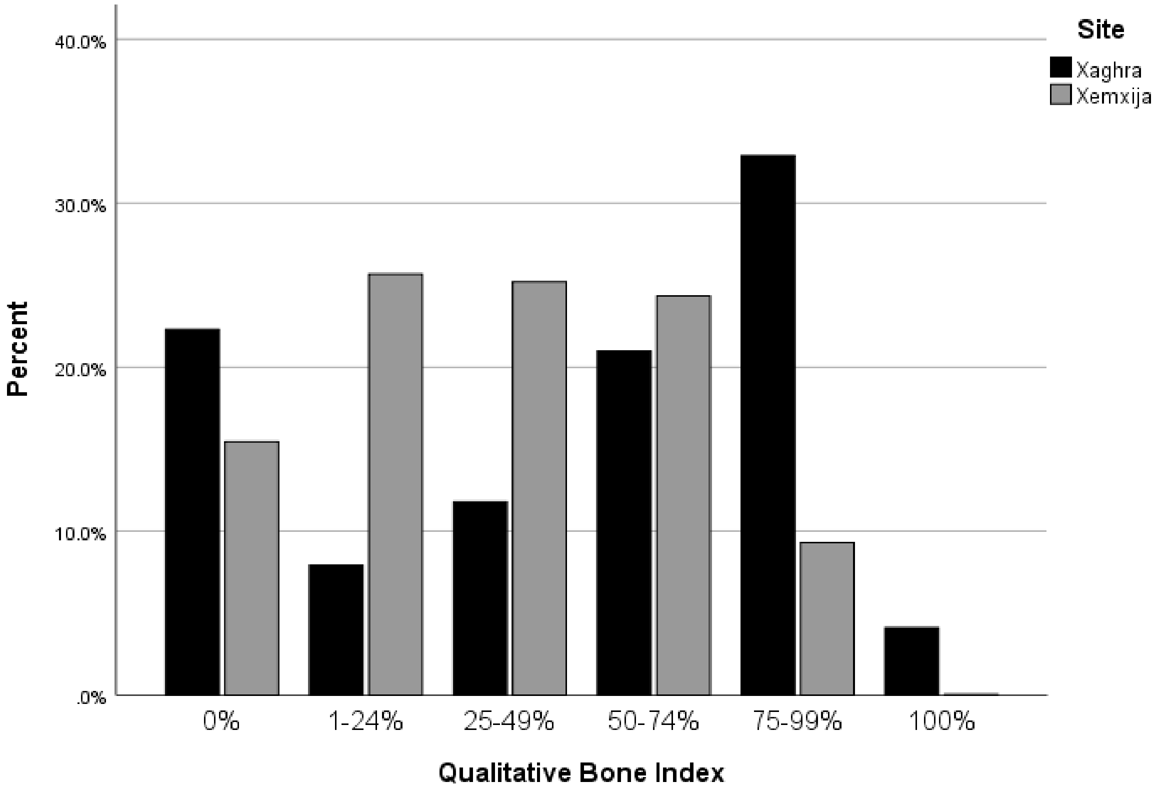


Figure 8.2: Cortical surface preservation (QBI) at both sites.

The correlation between element completeness (API) and preservation (QBI) in the Xagħra sample was tested using Spearman's rank order correlation. A medium strength positive correlation was found (r=.306, n=19056, p<0.01), with high levels of fragmentation associated with poorer cortical bone preservation. The correlation between completeness (API) and preservation (QBI) in the Xemxija assemblage was also tested and a medium strength positive correlation was again found (r=.362, n=14760, p<0.01). Therefore, it can generally be expected that as fragment size decreases, so too will surface preservation.

Comparing fragment size at both sites, it is evident that a greater number of small fragments (between 1–30 mm) were recorded from Xagħra (Figure 8.3). This illustrates more extensive fragmentation in some deposits at the Circle, as well as fuller recovery of small bones during excavation. Across the sample, mean fragment size is 1.5–4.25 cm, although the Xemxija assemblage is at the higher end of this range (Figure 8.4). At the Circle, the samples from (1307), (1206) and (354) are particularly fragmented.[1] The relationship between fragment size and QBI was tested across the whole sample using Spearman's rank order correlation and a weak correlation was found (r=.014, n=32842, p<0.05). The correlation is stronger when investigated at the site level, with the relationship between fragment size and QBI greater at

[1] However, the sample from (1206) contains a large number of small neonatal and perinatal remains and, as such, overall fragment size in this context does not necessarily reflect high fragmentation.

Xagħra (r=.094, n=18317, p=<0.01) compared to Xemxija (r=.065, n=14525, p=<0.01). While there is a correlation between fragment completeness and preservation, as discussed above, this correlation does not hold when investigated more closely. This is interesting, as it is often assumed that highly fragmented deposits will result in poor condition. However, at both sites, the limestone geology, dominant practice of primary deposition, and general lack of animal damage have contributed to generally fair preservation, including of highly fragmented bone.

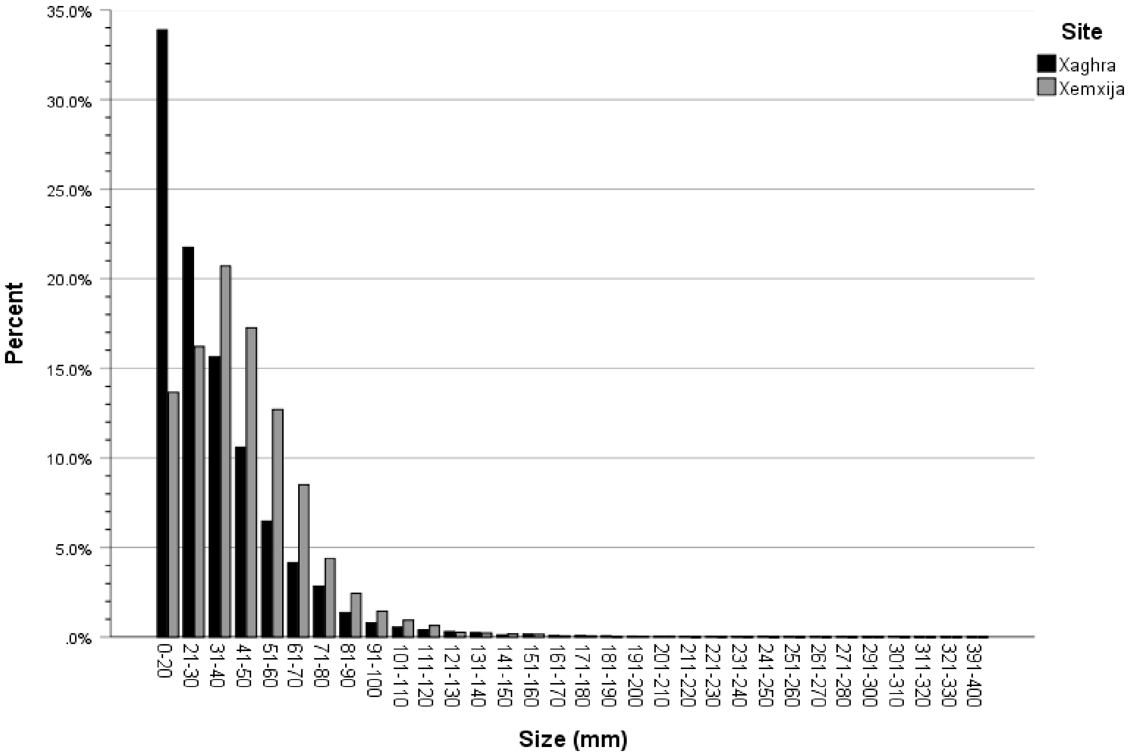


Figure 8.3: Fragment size at both sites.

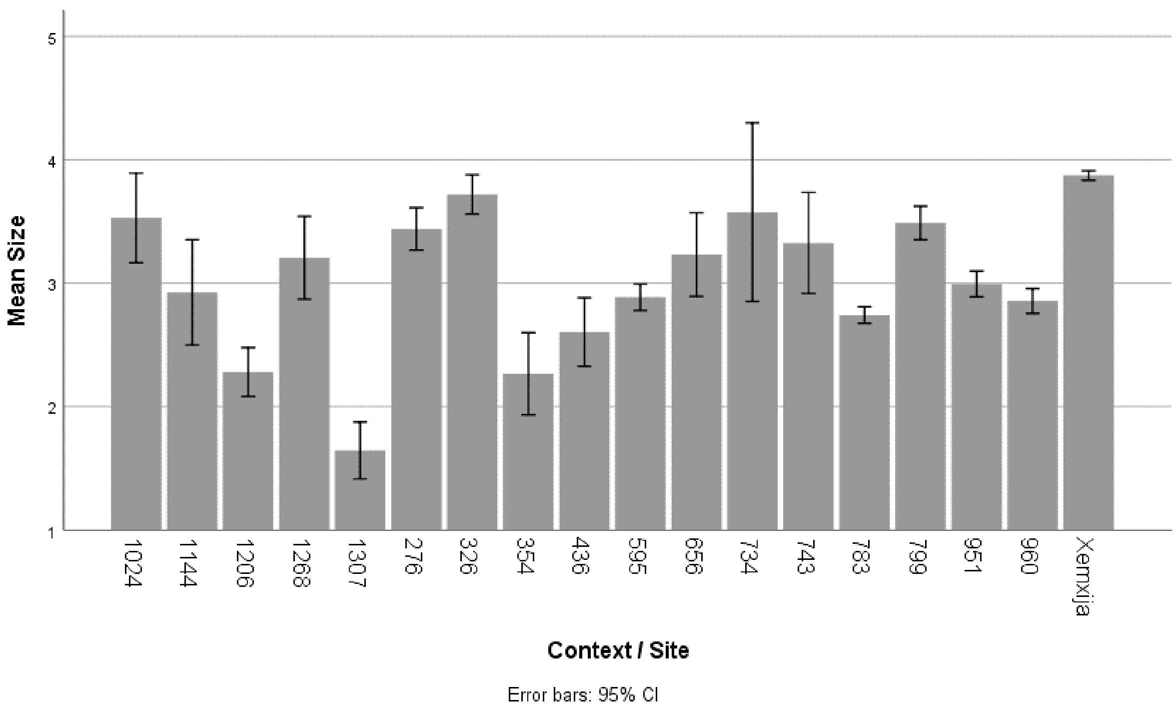


Figure 8.4: Mean fragment size by context (for Xagħra) compared to Xemxija.

8.2.2 Fracture morphology

Long bone fragmentation morphology was overwhelmingly characterised by dry bone breakage, with mean scores of 5.96–6 across all contexts (Figure 8.5). Only 12 fragments displayed fresh bone breakage (scoring 0–3): six long bones from the Xemxija Tombs and six from the Xagħra hypogeum, from the Deep zone, Southwest niche and Shrine. Therefore, although most bones were fragmented, breakage rarely occurred during the peri-mortem interval after death, suggesting that the destructive process of successive deposition is largely responsible for fragmentation (see §5.5.1).

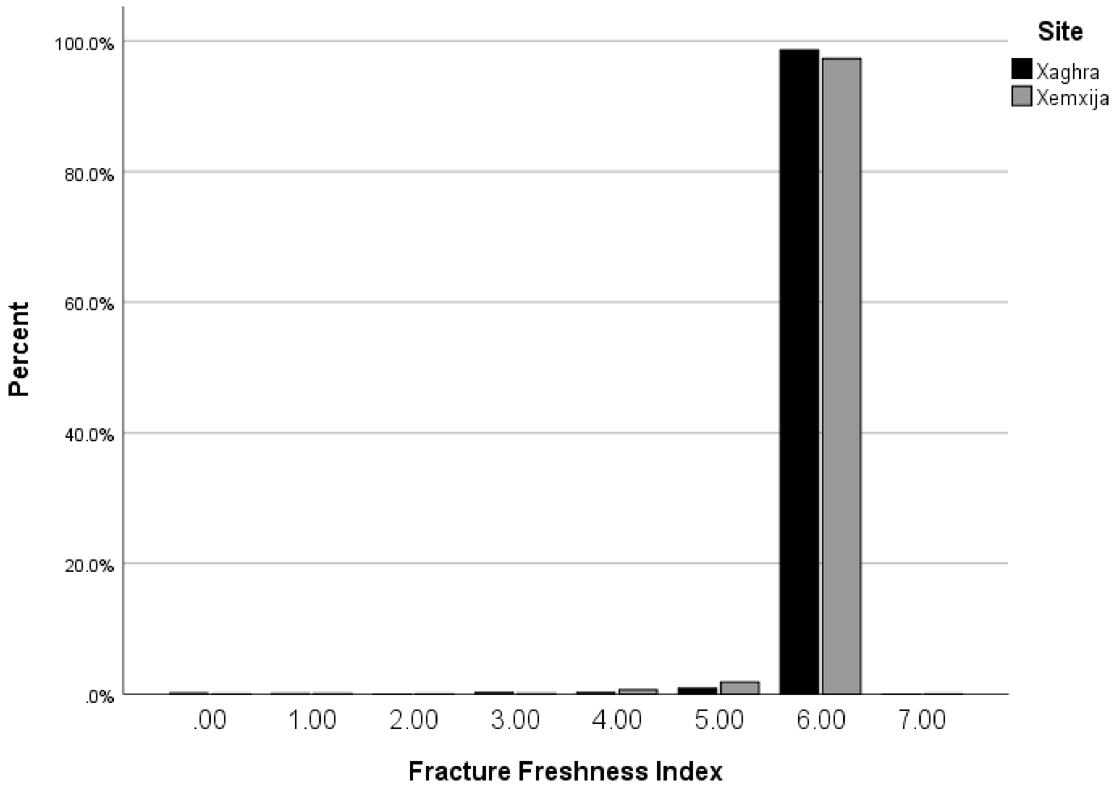


Figure 8.5: Long bone FFI scores at both sites.

8.2.3 Weathering

Weathering was observed on <10% of the sample from each site (Figure 8.6). Due to equifinality, it is difficult to ascertain the cause of these modifications. In addition to exposure, cortical flaking and cracking can be attributed to processes such as tumbling and *in situ* erosion (e.g. Andrews 1995), as well as inundation and sediment pressure (Fernández-Jalvo and Andrews 2016, 201). Increased incidences of weathered bone are present in contexts or areas with poor preservation and/or high fragmentation: the Xemxija Tombs, Xagħra rock-cut tombs and the Deep zone. This suggests that both natural and cultural processes are responsible for cortical cracking, flaking, and splitting. These processes may include extensive rearrangement and successive deposition, compaction due to overlying deposits, cyclical flooding and drying, and tumbling of bones. However, given the indicators for the circulation of bone, including the removal of selected elements from the Xemxija Tombs, and the redistribution of crania and long bones in the Xagħra Circle, rare instances of secondary deposition following exposure cannot be ruled out.

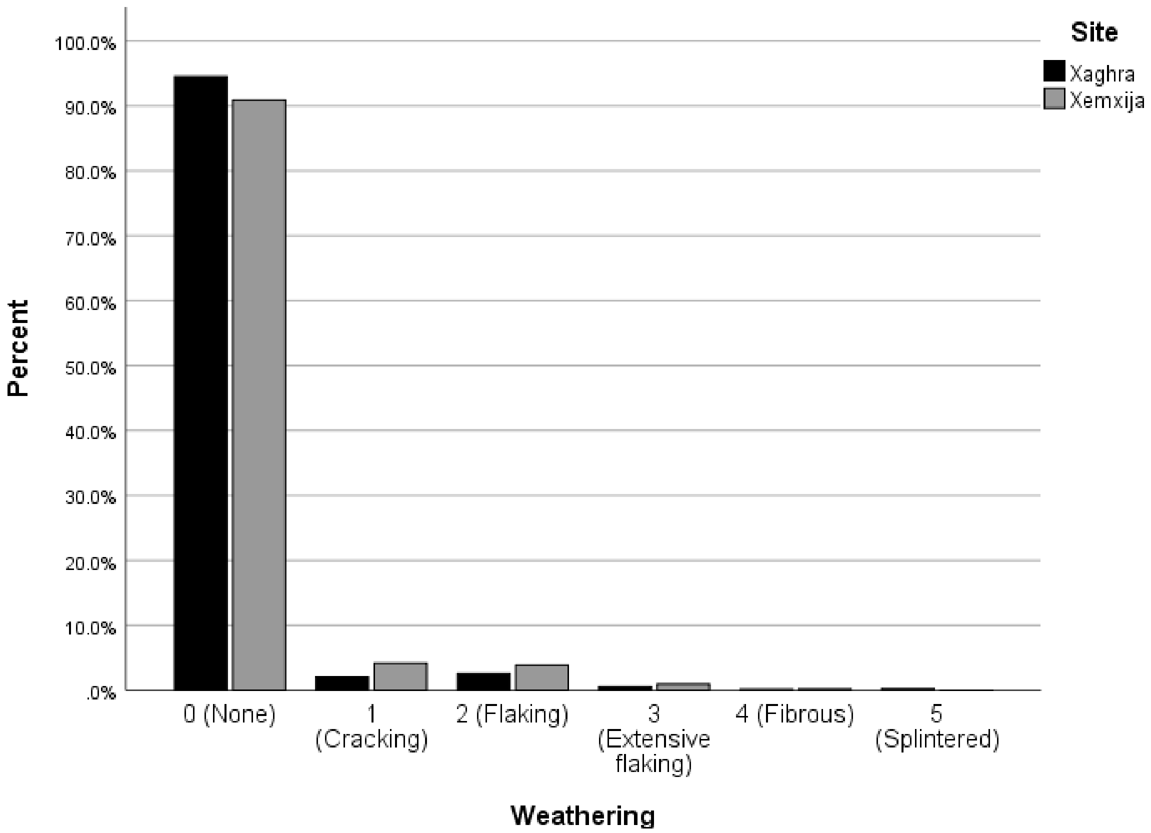


Figure 8.6: Weathering at both sites.

8.2.4 Abrasion and erosion

Abrasion and erosion were observed on <20% of the sample from each site (Figure 8.7). Analysed by area, abrasion and erosion is highest in the Southwest niche, followed by the Xemxija Tombs and Xagħra rock-cut tombs. There may be some specific environmental factors relating to small limestone chambers, as opposed to the larger and more open spaces in the centre of the Xagħra hypogeum, that accelerated abrasive and erosive destruction. Root etching is the main cause of erosion, although processes such as trampling and tumbling (especially in the Xemxija Tombs, see §6.3.4) may also be responsible.

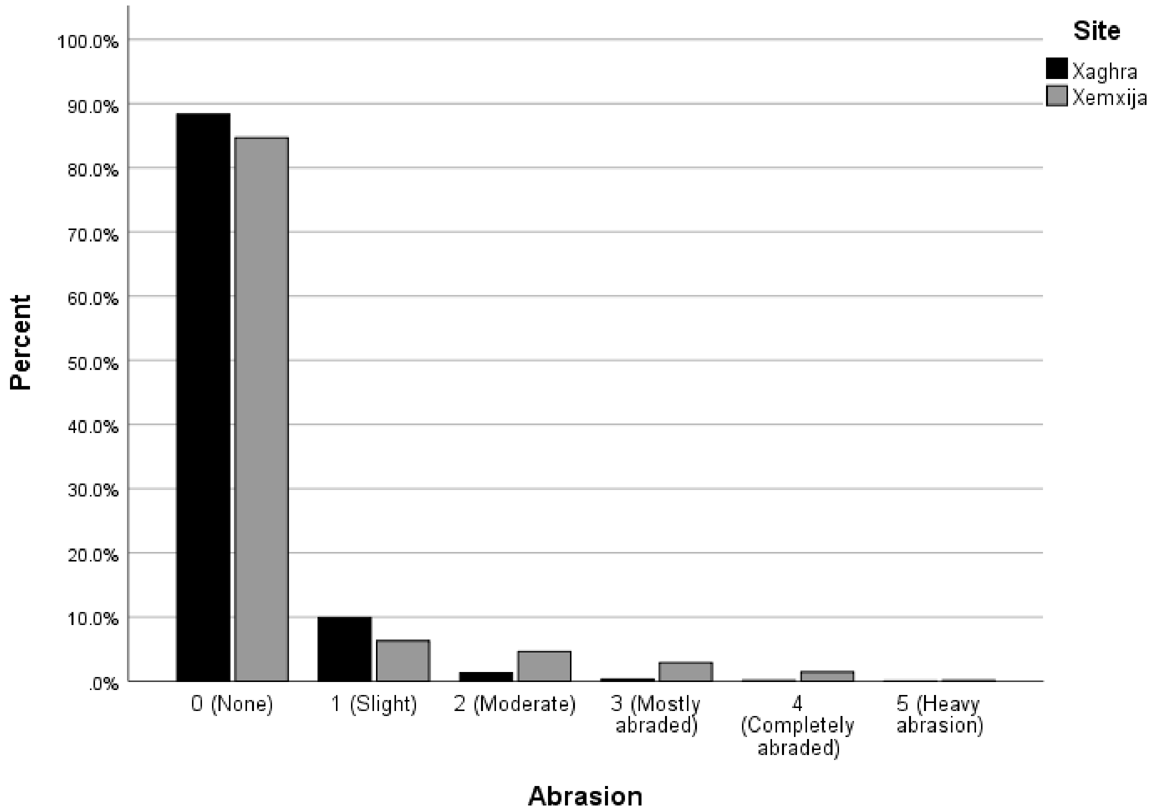


Figure 8.7: Abrasion/erosion at both sites.

8.2.5 Discolouration and burning

Discolouration was present on 12.5% of the assemblage from the Xemxija Tombs and 13.2% of the sample from the Xagħra Circle, most representing extensive ochre staining (10.5% and 9.8%, respectively), with the remainder due to soil staining, limestone concretion, and organic matter. Burning was observed on a small number of remains in the Xemxija Tombs and, at the Xagħra Circle, in the rock-cut tomb, Display zone and Shrine.[2] Further evidence of burning has been recorded in eight contexts at the Circle (R. K. Power pers. comm.).[3] In all cases, burning is consistent with incomplete charring, demonstrating the exposure of dry and fully skeletonised remains to an open flame.

8.2.6 Animal damage

Some evidence of animal damage was present in the form of modifications attributed to dermestid beetles and rodents. Rounded pits and bores between 1–4 mm in diameter were identified on cranial fragments and long bones from the Xemxija Tombs, Xagħra rock-cut tombs and North bone pit, and ascribed to dermestid beetle gnawing and pupation (Thompson *et al.* 2018). Dermestid bores along fragmentation margins on the Xemxija material indicates

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[2] Ronika Power (pers. comm.) noted burning on eight fragments in (960) from the Shrine area, five of which were recorded in this analysis.
[3] Further burning was recorded in context 68 (n=1), context 75 (n=1), context 113 (n=2), context 132 (n=1), context 329 (n=1), context 433 (n=1), context 920 (n=1), context 931 (n=1), and context 951 (n=1).

dermestids were transported into the tombs, either through an initial period of surface exposure of remains, through the primary deposition of corpses wrapped in hides, or a combination of both means (Thompson *et al.* 2018, 128). At Xagħra, dermestid bores and pits were present on long bones from the rock-cut tomb and (799) in the lower levels of the North bone pit. The humerus and femur exhibiting bores from the rock-cut tomb present some cortical abrasion and flaking, which may be attributed to weathering or *in situ* tumbling. The pupation chambers are preserved as partial casts, indicating some dried flesh was intact when they were excavated. Although no *in situ* articulations appear to have been preserved in the West chamber, SER does not strongly indicate secondary depositions, and the dominant practice was primary deposition, perhaps with selective bone removals. Dermestid bores and pits were present on the left tibia and right femur of the adult male in (799). That this individual was deposited soon after death (see §7.3.7.1) suggests the presence of an organic wrapping material or container which may have transported dermestid larvae into the pit.

Rodent gnawing (n=14) was present in Xemxija Tombs and, of all human remains from the Circle examined by the FRAGSUS Population History workgroup, only one element exhibited rodent gnaw marks (R. K. Power pers. comm.). This demonstrates contrasts between the sites, suggesting that the Xemxija Tombs may have been open to scavengers, while the burial space of the Xagħra Circle hypogeum was protected. The enclosing megalithic circle at Xagħra therefore seems to have acted both as a symbolic and physical barrier to the remains interred within, as argued previously (see Stoddart 2015, 133).

8.2.8 Summary

The full taphonomic data are summarised in Table 8.1. The relationship between variables was investigated using Spearman's rank order correlation. The association between burning and beetle damage is not significant (r=-.002, n=33,816). There is a medium strength relationship between abrasion and weathering (r=.044, n=33,814, p<0.01). Beetle modification alongside weathering (r=.065, n=33,815, p<0.01) and abrasion (r=.039, n=33,815, p<0.01) is also significant. This indicates that beetle damage is often, but not always, associated with weathered bone, perhaps to be expected in the context of successive deposition where bone preservation is often poor. Fragmentation is largely consistent across the samples from both sites, demonstrating the destructive effects of successive deposition. The preservation and condition of bone is highly varied, however, reflecting differing practices and taphonomic processes across contexts and burial spaces. This variation is considered further below.

Taphonomic feature	Xemxija Tombs 1–6	Xagħra rock-cut tombs (276), (326)	North bone pit (354), (799)	Display zone (783)	Deep zone (951), (1144), (1307)	'Shrine' (960), (1024), (1206)	Central pit (436), (743)	Southwest niche (595), (656), (734)
<5 cm in size	66.8%	84.2%	77.1%	81.1%	76.1%	81.2%	83.7%	79.1%
Mean fragment size	3.87 (SD 2.635)	3.61 (SD 2.754)	3.36 (SD 3.08)	2.74 (SD 2.325)	2.83 (SD 2.27)	2.78 (SD 2.738)	2.85 (SD 2.20)	2.95 (SD 2.745)
<1/2 complete	74.4%	78.2%	84.8%	71.7%	87.8%	68.6%	81.4%	68%
Mean API	1.89 (SD 1.451)	1.66 (SD 1.245)	1.51 (SD 1.178)	1.93 (SD 1.407)	1.43 (SD 1.094)	2.03 (SD 1.463)	1.45 (SD 1.08)	1.91 (SD 1.438)
<1/2 well preserved	66.3%	94.5%	76.5%	12.6%	41%	18.3%	85.3%	33.6%
Mean QBI	1.87 (SD 1.63)	0.28 (SD 0.589)	1.01 (SD 1.472)	3.35 (SD 1.070)	2.24 (SD 1.310)	3.36 (SD 1.068)	0.99 (SD 1.18)	2.82 (SD 1.503)
Mean FFI	5.96 (SD 0.293)	5.99 (SD 0.125)	5.97 (SD 0.179)	5.99 (SD 0.054)	5.8 (SD 0.926)	5.97 (SD 0.359)	6.0 (SD 0.0)	5.97 (SD 0.26)
Abrasion/ erosion	15.3%	10.3%	7.4%	11.4%	6.4%	8.9%	7.6%	24.4%
Mean abrasion/ erosion	0.30 (SD 0.819)	0.15 (SD 0.5)	0.08 (SD 0.288)	0.12 (SD 0.352)	0.08 (SD 0.356)	0.09 (SD 0.303)	0.08 (SD 0.26)	0.33 (SD 0.684)
Weathering	9.1%	16.6%	0.3%	2.8%	13.3%	2.2%	3.9%	4.7%
Mean weathering	0.15 (SD 0.533)	0.43 (SD 1.078)	0.0 (SD 0.055)	0.04 (SD 0.273)	0.22 (SD 0.583)	0.03 (SD 0.241)	0.04 (SD 0.19)	0.06 (SD 0.303)
Insect damage	0.3%	0.1%	0.9%	0	0	0	0	0
Gnawing	0.9%	0	0	0	0	0	0	0
Burning	0.2%	0.9%	0	0.02%	0	0.1%	0	0
Cutmarks	0	0	0	0	0	0	0	0
Total analysed	**14760**	**2083**	**2298**	**4953**	**2352**	**3912**	**355**	**2869**

Table 8.1: Overall taphonomic results for the Xemxija tombs and Xagħra Circle, according to spatial location.

8.3 Deathways at the Xemxija Tombs and Xagħra Circle

As discussed above, several key variables have affected the preservation and condition of the osseous remains at both sites. Although the limestone geology of the Maltese islands is amenable to bone preservation, its porosity also means that it is prone to inundation. Located at high elevations, it is possible that both Xemxija and Xagħra occasionally experienced low levels of inundation due to surface water run-off, and this may have shifted bones, accelerated their degradation, and caused sediment concretion in some areas. Root etching has also undermined bone preservation, contributing to cortical degradation and occasionally splitting bones, and deposits would have been susceptible to tumbling. If corpses were placed on precarious deposits or at angled orientations, such positioning would have influenced the movement of bones as they progressed through decomposition. With exceptionally deep deposits throughout the hypogeum, bones were almost certainly trampled, especially during the later stages of its use. These processes, alongside the effects of successive deposition, contributed to substantial disarticulation and fragmentation.

Untangling the effects of natural processes and cultural practices on element representation, the predominance of primary deposition in most contexts is demonstrated (See §7.7). Apart from several contexts with a clear emphasis on the re-deposition of disarticulated elements, most comprise simultaneous primary and secondary practices, with the balance between each differing in each space. Classification of the element representation profile and inferred funerary practices in each context is presented chronologically below (Table 8.2). Many contexts did not present an obvious signature of depositional modes through SER, due to successive deposition, and therefore small differences in the representation of some elements alongside reference to excavation records, provides further insight into funerary practices.

Given that relatively few individuals were not disturbed through later interventions, a dominant praxis of unmaking the dead is apparent. This is shown by the analysis of all remains from 97E/112N in context (783) (§7.5.2.7). Directly on the bedrock, an adolescent (15.5±3 years) was deposited and their body left undisturbed; the overlying sequence of deposition included three further partial skeletons of nonadults. Skulls were removed from two individuals, and limbs from all individuals, leaving the vertebrae and ribs in connection. Two of these individuals were placed on a similar axis as the basal inhumation. The citation of burial positions detected is also borne out across other spaces within the hypogeum (e.g. the Shrine sequence and Central pit, see Stoddart et al. 2009, 121–122, 140–149).

Context	Location	Phase	SER profile	Inferred practices
276	Rock-cut tomb: West chamber	Ġgantija	Successive deposition	P, R, BR, CC
326	Rock-cut tomb: East chamber	Ġgantija	Successive deposition	P, R, BR
Xemxija Tombs		Ġgantija, Early–Middle	Residual	P, R, SD, BR
354	North bone pit	Early	Cranial curation	SD, CC
1307	West Cave: Deep zone	Early	Cranial curation	SD, CC
595	East Cave: Southwest niche	Early	Residual	P, R, SD, BR
656	East Cave: Southwest niche	Early	Secondary deposition	SD (especially long bones)
734	East Cave: Southwest niche	Early	Successive deposition	P, R
799	North bone pit	Early	Successive deposition	P, R, SD
951	West Cave: Deep zone	Early	Cranial curation	P (occasional), SD, CC
1024	West Cave: Shrine	Middle	Cranial curation	SD, CC
1144	West Cave: Deep zone	Middle/Late	Cranial curation	P, SD, CC
960	West Cave: Shrine	Middle/Late	Successive deposition	P, BR
436	East Cave: Central bone pit	Latest	Long bone curation	P
1206	West Cave: Shrine	Late	Successive deposition	P, BR
743	East Cave: Central bone pit	Latest	Long bone curation	P
783	West Cave: Display zone	Latest	Successive deposition	P, SD, BR, CC

Table 8.2: Chronological phasing of contexts and dominant funerary practices (abbreviations: P: Primary; R: Reduction, SD: Secondary Deposition, BR: Bone Removal; CC: Cranial Curation).

Drawing together the proposed models of deathways at each site (see Figures 6.30 and 7.108), there are some areas of convergence and distinction. At both the Xemxija Tombs and Xagħra Circle, nonadults are incorporated in the burial space and treated similarly to adults, although fewer nonadult remains appear to have been removed from the Xemxija Tombs. At Xagħra, the representation of nonadults fluctuates over time, increasing in the hypogeum compared to the rock-cut tomb, with a slight peak during the middle Tarxien phase (Thompson *et al.* in press). According with the radiocarbon results for the density of deposition (see §4.3.1), and a widespread phase of cultural elaboration across the islands, the greater number of nonadults deposited in this phase may suggest increased fertility, demonstrating the close relationship between burial demographics and the population structure (*ibid.*).

The typical funerary treatment at both sites involved primary deposition and later rearrangement and curation of remains. At Xemxija, curation occasionally involved the removal of selected bones from the burial space.[4] Weathered elements from the Xemxija Tombs also suggest that some elements may have been deposited following exposure, though this is difficult to clarify due to equifinality. In contrast, at Xagħra, bones appear to have circulated solely within the limits of the Circle. However, these secondary practices were typically focused on the skull or cranium, and the limbs (or long bones), reducing the body to the trunk and its appendages. The extent and process of rearrangement cannot be examined at the Xemxija Tombs. At the Xagħra Circle, the application of archaeothanatological principles has provided new details on the process by which some individuals were disarticulated. In several areas, including the Xagħra rock-cut tomb, the Display zone and the Shrine, a paradoxical pattern of *in situ* articulation was discerned, with the disruption of persistent joints and maintenance of more unstable articulations. Analysis of the decomposition sequence of a seated corpse found that some joints disarticulated at unexpected times due to the position of the body and space of burial (Mickleburgh and Wescott 2018). These factors are difficult to account for in many cases, even at the Xagħra Circle. However, numerous observations of articulated skeletal regions (especially isolated lower arms and hands with wrist joints and metacarpals intact, and lower legs and feet with tarsals and metatarsals in anatomical connection) imply disruption of the corpse during the decomposition process.

Several spaces within the Xagħra Circle witnessed changing depositional modes and, while the Shrine and Deep zone present a similar SER profile across contexts, multiple funerary practices are evident in most spaces (Figure 8.8). Contexts predominantly containing secondary depositions may be largely restricted to the early and middle Tarxien phases (see Table 8.3), but for the most part there do not seem to be any spaces where singular practices prevailed throughout centuries. The East Cave Central pit represents interments of single individuals in the cave roof, a practice which became common in the latest Tarxien phase but does not represent the sole mode of deposition.[5] The North bone pit was in use for several generations,

[4] Some alternative hypotheses may be put forward, including historic looting, and differential practices across tombs. However, neither are verifiable, and the biased representation of long bones at Xemxija accords with their role in secondary practices at the Xagħra Circle.

[5] Human bones excavated from deposits overlying the slumping of the North Cave roof included context (836) which contained fragmented cranial bones, and context (768) containing nonadult hand and feet bones (Cutajar *et al.* 2009, 207), both likely dating to the Tarxien. Slump deposits in the East Cave included context (130) which contained mostly cranial fragments (MNI=4) suggested to date to the Tarxien or Tarxien Cemetery phase (Cutajar *et al.* 2009, 213).

during which varied depositional modes are evident, including an undisturbed inhumation, cranial curation, and secondary deposition of body parts and disarticulated elements. This pit may represent the hypogeum in microcosm, encompassing most of the practices encountered within the much larger burial space. Deposits in the Southwest niche are particularly disturbed, with changing trends in bone removal, element caching and curation. The complex sequence in the Deep zone, although presenting a signature of cranial caching across the analysed contexts, encompassed occasional primary depositions which were rearranged, as well as secondary deposition of long bones and caches of other elements.

	North bone pit	**Southwest niche**	**Deep zone**	**Shrine**
Early: 2900–2700 BC	(799) successive deposition. *(697), (669), (662) and (663 secondary deposition. (354) cranial curation.	(734) successive deposition. (656) long bone curation. (595) successive deposition.[6]	(1307) cranial curation. *(1234) and (1237) primary deposition. *(1225) residual.	*(1328) 'bundle burials'.[7] *(1268) stacked primary and disturbed primary deposition.
Middle: 2700–2500 BC	N/A	N/A	(1144) cranial curation. *(1111) and (1200) secondary deposition.	(1024) cranial curation.
Late: 2500–2400 BC			(951) cranial curation. *(933) cranial curation.	(1206) disturbed primary deposition, successive deposition. (960) disturbed primary deposition, successive deposition.

Table 8.3: Funerary practices over time in locations with multiple contexts analysed. Contexts preceded with '*' are described on the basis of reports in the original publication (see Stoddart, Malone *et al.* 2009).

[6] (595) is included here as it remains possible that the context represents the re-deposition of Żebbuġ material at a later date.

[7] It is unclear whether these represent primary interments of contracted individuals which were later disturbed or curated remains which were deposited as part of a final act. None of the individuals are complete and there are intriguing observations of 'blackened bone' (see Stoddart, Barber *et al.* 2009, 142) which have led some to suggest these individuals may have been mummified or otherwise preserved (Parker Pearson 2012).

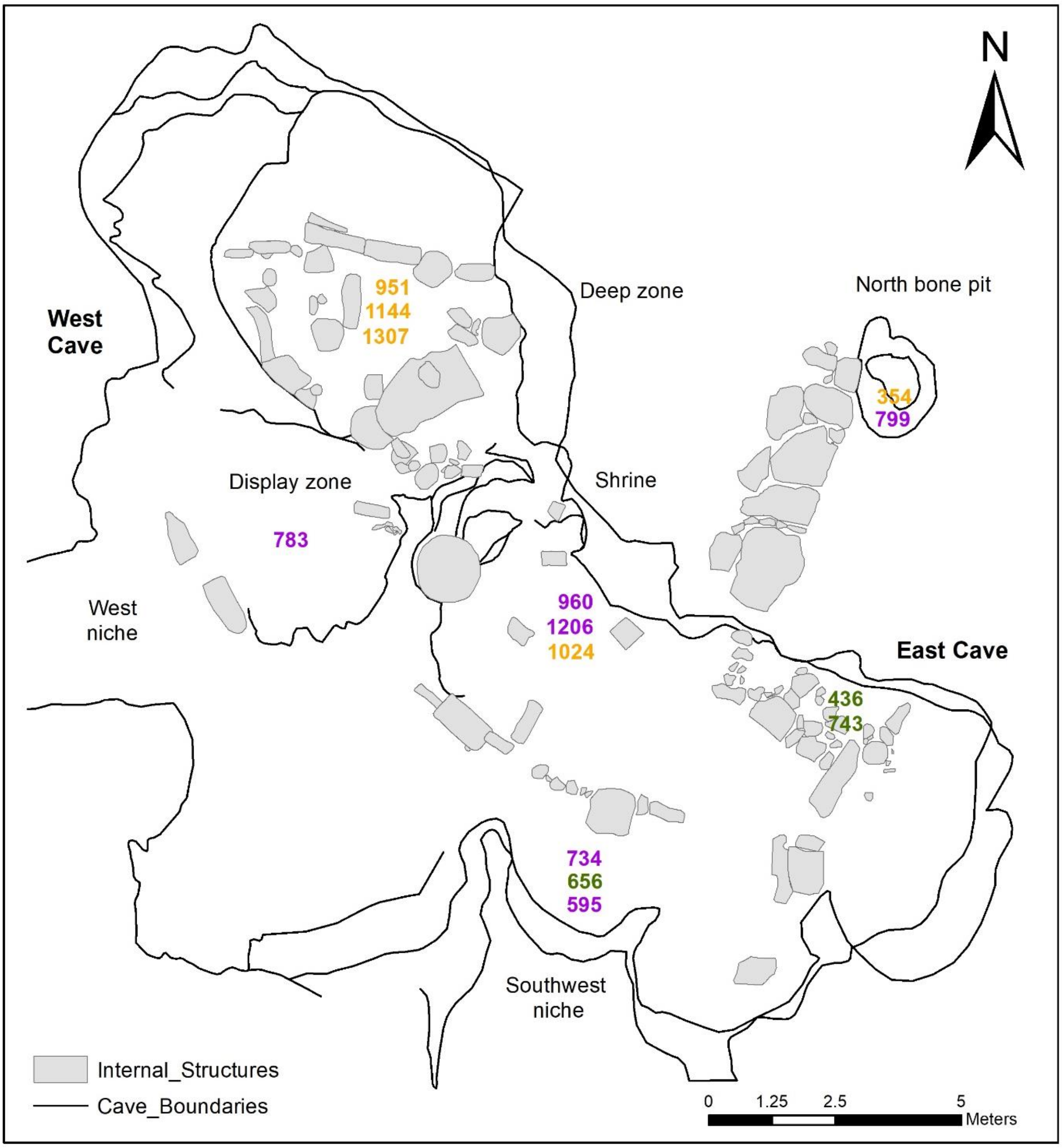

Figure 8.8: Predominant funerary practices in each context analysed from the Circle represented spatially (purple: successive deposition, orange: cranial curation, green: long bone curation).

The Display area, containing one large stratigraphic context, was used predominantly for primary deposition, but these were often disturbed and disarticulated, and focal areas of cranial caching and secondary deposits can be identified. In the Shrine, primary depositions dominate the sequence; select individuals remained in articulation in earlier levels, while later levels contain more partially articulated remains. Both spaces would have been highly visible from selected locations within the hypogeum, a factor which likely influenced the ways in which they were used (Thompson *et al.* in press). Previous discussion has highlighted the Display zone as a space where the dead were laid out and manipulated (Malone and Stoddart 2009, 365;

Stoddart, Malone *et al.* 2009, 161). However, this was also the case for the Shrine since its foundation, and may also be inferred in the East Cave (1241), suggesting that larger and more central or accessible spaces were appropriate for maintaining individuals in greater levels of articulation.

8.4 Deathways throughout the late Neolithic

Funerary practices can be traced temporally through reference to the established site chronologies (see §4.2.1 and §4.3.1). Tarxien contexts at the Circle have been divided into early (2900–2700 BC), middle (2700–2500 BC), late (2500–2400) and latest (<2400 BC) phases to track population health, demography, and diet (Power *et al.* forthcoming).[8] This scheme is adopted here, allowing comparison with the results of broader analyses. Visualised over time, the contexts included in this research cluster mostly within the early and middle Tarxien phases (Figure 8.9). At the commencement of deposition in the North bone pit, Deep zone and Shrine, depositions within the rock-cut tomb were in the relatively distant past. Deposits in the Deep zone and Shrine built up rapidly and were in use contemporaneously for several centuries. Most data from the latest phase of the site's use is from (783), when depositions within the Shrine and peripheral areas had mostly (but not fully) tailed off. The few interments in the Central pit sequences in the East Cave roof also date to the latest phase and form part of a wider trend of pit depositions at this time (Stoddart, Malone *et al.* 2009, 118–123). This sense of history is lacking at Xemxija, but it is unlikely that interments were steady and uninterrupted throughout the millennium of the site's use.

The continuity of certain depositional modes is evident. Primary interment occurred in all rock-cut tomb contexts, as early as 3600–3500 cal BC at Xemxija and Xagħra, and into the latest Tarxien contexts analysed in the Xagħra hypogeum. However, the subsequent treatment of primary depositions appears to change over time. Less 'structured' disturbance is inferred in the earlier contexts; practices of reduction or clearance may have been necessitated by the small spaces of rock-cut tomb chambers. Where there is contextual recording of bone groups *in situ*, there is minimal evidence for articulation, although the articulated hand in the Xagħra rock-cut tomb East chamber recalls the paradoxical order of disarticulation observed in later contexts (Stoddart, Barber *et al.* 2009, 319).

In contrast, the hypogeum allowed for greater movement of disarticulated parts and bones. The middle and late phases of the hypogeum's use, at the peak of the probability density, suggest increasingly rapid deposition, perhaps with less time elapsed between interments than

[8] Following Malone *et al.* (2019) the Southwest niche is excluded from the chronological model, as it contains disturbed (or re-deposited) Żebbuġ remains, overlain by later depositions.

in earlier contexts. If this is the case, greater interaction with decomposing corpses can be inferred, as opposed to the manipulation of already-skeletonised remains which appears to have predominated in earlier contexts. This is important to note, suggesting that the distinctive signature of paradoxical *in situ* articulations is a phenomenon specific to the Tarxien phase, which likely flowed from earlier practices of clearing and redistributing skeletal remains.

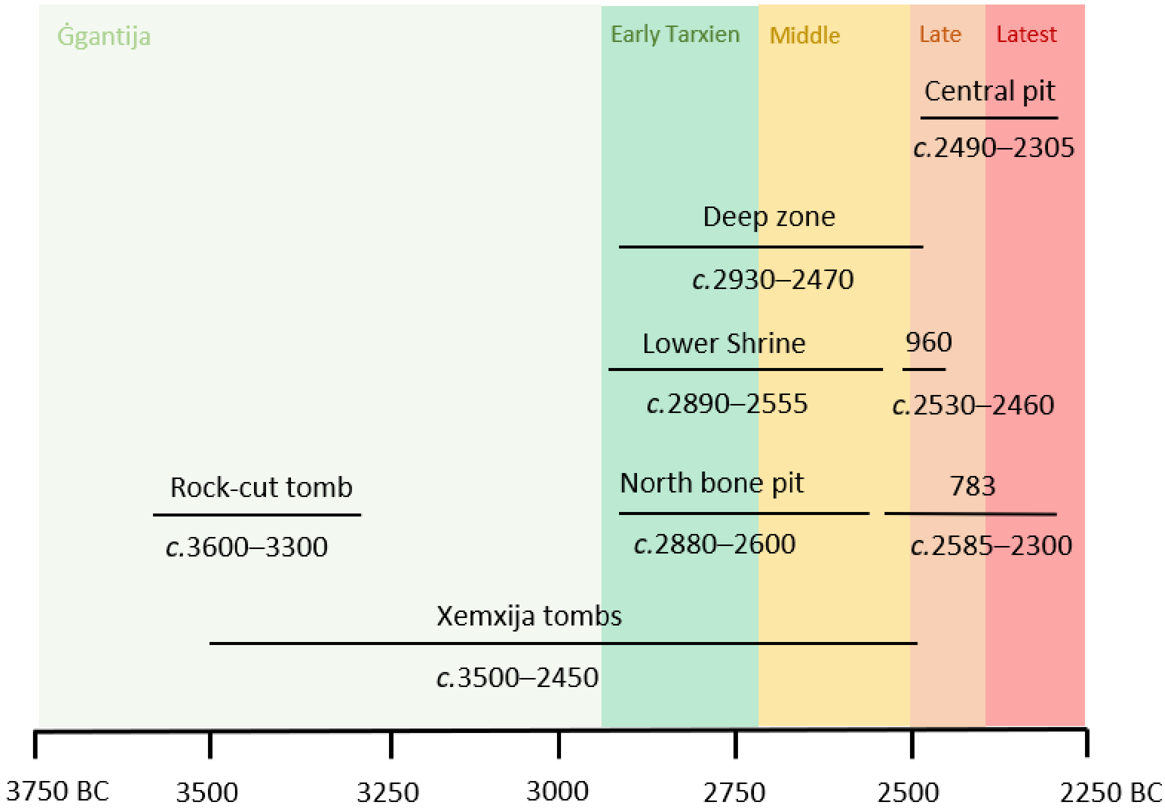

Figure 8.9: Duration of use in contexts and areas included in this analysis, based on results in Malone *et al.* (2019).

Memory clearly played a central role in depositional events (cf. Stoddart 2015). As argued above, over the short-term of perhaps single generations, commemoration may have guided the placement and positioning of successive depositions. If we follow Jones' (2007, 25) reasoning that remembrance is an ongoing process between materials and people, returning to the same area and reiterating earlier burial positions may be a direct response to previous actions. Coming back to the deceased's remains and directly interacting with them would have been an emotionally-charged process. These embodied citational acts (Butler 1993; Jones 2005, 2007) drew together relationships between the past and the present, and precipitated future events. Depositing the dead was a first step which oriented a sequence of actions, including revisiting and redistributing body parts of the interred individual and, later, imitating their placement with another interment (Thompson *et al.* in press). Areas were perhaps marked out for certain individuals or kin groups, locating small-scale acts of remembering within a larger commemorative space.

There are some crucial changes in funerary practices from the mid-4th to mid-3rd millennium BC at the Xagħra Circle, which may reflect wider trends in funerary practices across the islands (Figure 8.10). Given the evidence from rock-cut tombs, a higher proportion of weathered or exposed remains alongside primary depositions might be expected in the Ġgantija phase, alongside the removal of selected bones from burial spaces. At Xagħra, a carefully structured and timed sequence of disarticulation emerged during the early 3rd millennium. Correspondingly, certain areas contained a higher proportion of secondary deposits during the early and middle Tarxien phases. Later deposits in the Xemxija Tombs might have reflected such developments, although analyses of well-recorded contemporary assemblages, such as the Kerċem rock-cut tomb, are required to examine this. During the latest Tarxien phase, interments in pits and the cave roof at Xagħra tentatively suggest that post-mortem disturbance gradually became a less common aspect of the mortuary process.

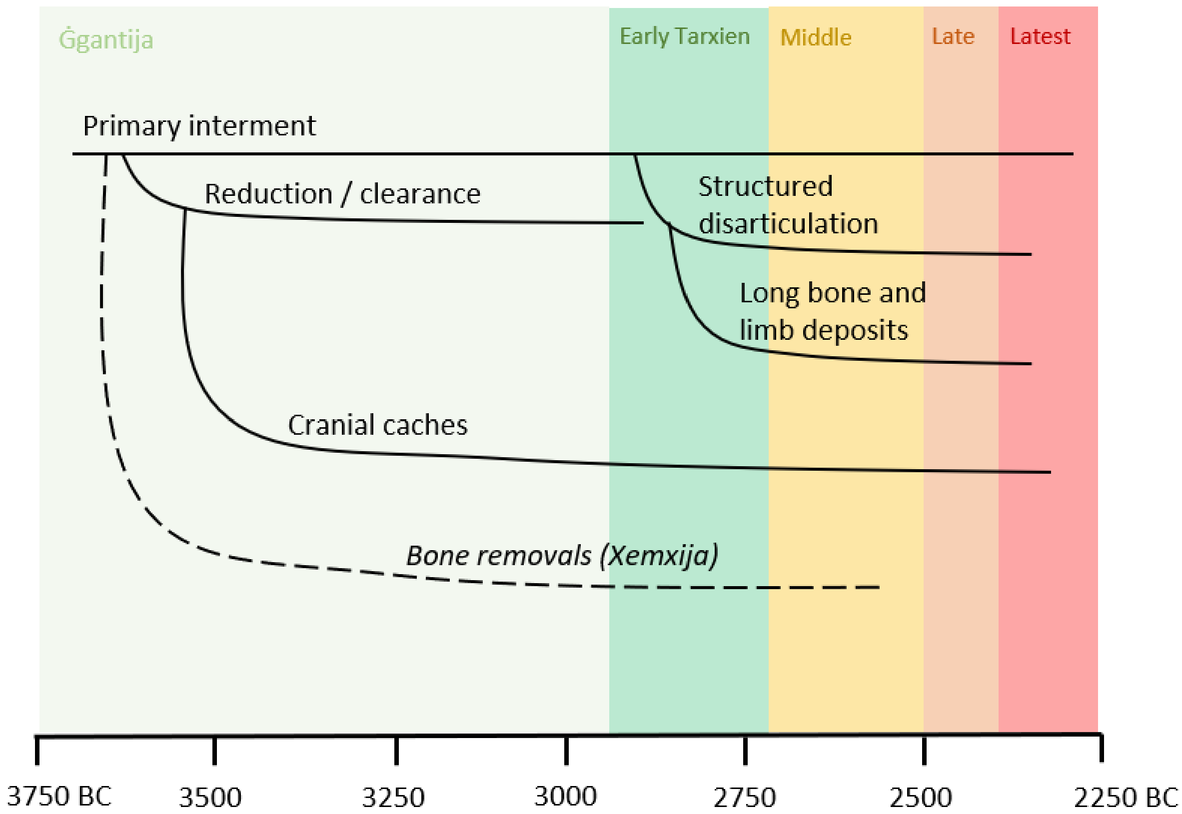

Figure 8.10: Model of deathways through time at Xagħra and Xemxija.

The peak density of radiocarbon dates at the Circle, between 2600–2500 cal BC, coincides with a period of environmental stress on Gozo, and perhaps also on Malta. Soils had significantly deteriorated, requiring careful maintenance. From the mid-late 3rd millennium BC at the Ġgantija temples, soils were deliberately enhanced through the inclusion of organic materials (French *et al.* 2018, 350). Stable isotope analyses indicate decreasing δ15N throughout the Tarxien, suggesting changing agricultural and animal husbandry practices

(McLaughlin, Power *et al.* forthcoming). These environmental and agricultural changes correlate with increasing incidences of linear enamel hypoplasia in the Xagħra Circle population from *c.*2550 cal BC, attributed to greater stress or trauma (Power *et al.* forthcoming). Multiple strands of evidence therefore highlight precarity during the mid-3rd millennium BC, coalescing with the increase in deposition at the Xagħra Circle hypogeum. The fluctuating tempo of deposition illustrates an increased concern with creating and affirming links to the past during the later 3rd millennium. Under these circumstances, 'the past in the past' (Bradley 2002) gained greater significance, with the ancestral dead more regularly visited and, perhaps, believed to form a resource which played an important role in future stability and prosperity (Bloch and Parry 1982).

8.5 The process of dying in late Neolithic Malta

As discussed above, the typical mortuary process involved rearranging the remains of the dead, potentially multiple times after their deposition. Occasionally, however, some bodies were left undisturbed. Primary depositions were the baseline from which diverse post-mortem actions were developed (Figure 8.11). Careful taphonomic analysis has shown a general structure and sequence of these actions, but it is also evident that there was much flexibility. The process of rearranging the dead typically focussed on appendages—skulls or crania, and limbs or long bones—but the combination of parts or elements removed could have been unique choices made at each event.

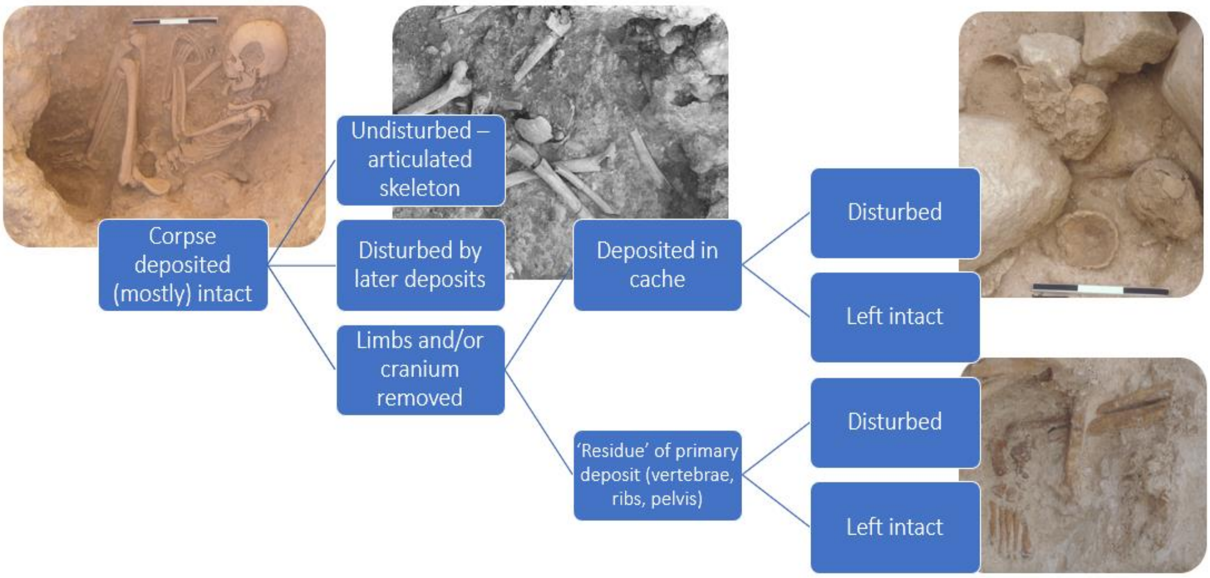

Figure 8.11: Model of typical deathways (photos from BRX archive).

Dying, in 4th–3rd millennium BC Malta and Gozo, was an extended process involving repeated interactions between the living and the dead, in the course of carefully managing the deceased's corporeal remains. Reducing the deceased to multiple parts and placing them in relation to the remains of numerous other individuals, in various states of decomposition and skeletonisation, achieved their commingling within the community of the dead. Burial spaces created a visible and palpable sense of communal history and ancestry. In this way, the fact that some individuals were not revisited and engaged with may not have negated their role or importance, as each person and their remains were integral to the architecture and atmosphere of the burial space. Instead, if we follow the ethnographic literature on post-mortem rituals, for example in Madagascar (e.g. Bloch 1971; Larson 2001) and Tana Toraja (e.g. Tsintjilonis 2000; Waterson 1993), we may suggest that occasionally there were insufficient kin, or material resources, to return to the dead and attend to their remains.

Imagining the mortuary process in 3rd millennium BC Malta, drawing together ethnographic accounts with the taphonomic results, the following stages are suggested:

- On the event of a death, a series of pre-mortuary rituals were carried out. Relatives, kin and other mourners may have gathered in and around the deceased's hut to wash and dress the corpse. Villagers and more distant relations could have been called upon to prepare a feast while the dead were attended to. Corpses were probably shrouded, with hides or reed mats, providing a covering for their body during transport to the burial place.
- Before or after deposition (perhaps both), communal feasting might have taken place in the village or in the vicinity of the burial place, with some of the remains of the feast (especially pig, cow and sheep/goat bones) accompanying the dead.
- The corpse was carried to the burial site relatively soon after their death. At rock-cut tombs, perhaps only one individual (maybe a 'death attendant') would have accompanied the dead into the tomb chamber, to rearrange the remains of the earlier depositions and settle the dead into place. In the hypogeum, greater space would have allowed larger numbers of kin/mourners to participate in the funerary ritual, theoretically (at least) widening communal participation.
- On entering the burial space, darkness would have been consuming and the smell of death overpowering. Flickering torchlight provided visibility for a short distance, enough for a small tomb chamber, but not to capture the full extent of the hypogeum. Placing the dead required watching out for the shifting deposits of fragmented bones underfoot.
- Accompanying the corpse, mourners witnessed large numbers of the dead in states of decay and skeletonisation. Touching the dead would have been unavoidable, perhaps even expected. Within the hypogeum, the stone screens and megaliths orientated movement and blocked the view of certain burial niches.

- The burial location may have been chosen based on knowledge about where recent interments were situated, where certain lineages had access to, where the decedent's relatives were interred, and which niches had more space. The dead body was then placed, in most cases on already-disarticulated remains, generally in a flexed position. Some personal and ritual items accompanied some individuals, including miniature pots containing ochre, anthropomorphic pendants, and worked flint and chert tools.
- Following a prescribed period, the deceased were usually revisited, sometimes during advanced stages of decay. Their remains were uncovered and, transformed and virtually unrecognisable, the process of disarticulation was begun, allowing their integration with the wider community of the dead.
- Individuals may have been revisited again, perhaps on the occasion of a later deposition, and their skeletonised remains further disaggregated. Eventually, they were covered by successive depositions and disarticulated remains, with later interments occasionally commemorating and respecting the position of initial depositions.

Memory was held as to who was buried where, and how, at least for the duration of one or two generations, and occasionally even after intermittent use of the space for a different practice. The particular state the dead were found in upon returning to their remains might have been a key factor which determined how they were treated; in this way, the dead exerted agency, or affect, which established their deathways. The placement of some individuals appeared to have greater pull and influence on later depositions; such sequences of similar practices might represent the continued use of an area by restricted lineages or communities. After a juncture of several generations, when the dead had been revisited multiple times, their social death was considered complete. This precipitated greater freedom in the treatment of remains, allowing for the clearance of older niches or the erection of megaliths into bone deposits (e.g. the eastern stone screen, see Stoddart, Malone *et al.* 2009, 154).

Parts of the above exposition are conjecture, while others are illustrated through taphonomic analysis. However, it is important to remember that aspects of each funerary process would have differed in some way to past experiences. As ethnography reminds us, rituals in small communities are flexible and difficult to interpret, sometimes without an obvious structure or pattern (e.g. Keesing and Haug 2012; Tsintjilonis 2000).

The sociological literature demonstrates several key ways of processing grief, including experiencing death as a process through maintaining continued bonds with the dead (Klass *et al.* 1996) and interring the dead in spaces which have some degree of permanence and can be revisited (Hockey *et al.* 2012). Prolonged post-mortem rites and the enduring use of burial spaces over centuries indicates that mortuary practices in late Neolithic Malta held strong emotional and mnemonic significance. Furthermore, the temporality of these rites highlights the protracted nature of social death. The core aim of deathways in late Neolithic Malta emerges through this analysis: they formed a slow, prolonged process of dying, in which deceased persons were gradually removed from the living community and integrated into the realm of the dead. The collective presence of the dead assured the living that they, too, would remain present in collective memory long after biological death.

CHAPTER NINE

BODIES, BODY PARTS AND PERSONHOOD

"Bodies are the mediating relation. When we do not survive, we become body; a body is what is left. A body is behind. A body is vulnerable; we are vulnerable. A body tells us the time; bodies carry traces of where we have been."
—Sara Ahmed, 'Living a Feminist Life' (2017, 247).

9.1 Introduction

This chapter addresses the final research questions outlined in Chapter 1, examining how aspects of lived identity—specifically age, sex and gender—related to burial treatment, and how bodies and personhood were understood in late Neolithic Malta. Summarising the key archaeological evidence in Chapter 2, the narrative of emerging social hierarchy was critiqued for its reading of distinctions in funerary practices as relating to status. Instead, I argued that personhood emerges through negotiating identity across multiple fields of action, and thus the treatment of the dead must be explored holistically. To do so, in Chapter 3, I demonstrated how bodies and personhood have been interpreted in other regions of Neolithic Europe, principally drawing upon burial data, bioarchaeological analyses, and figurines.

In Neolithic Malta, anthropomorphic figurines provide the other main source of evidence on ideas about the body, presenting the opportunity to integrate analysis of representations of the body with mortuary practices. Incorporating results of recent bioarchaeological analyses of the Xagħra Circle population provides additional perspectives on lived experiences. Key findings from this analysis include the social significance of young individuals, and the ambiguous nature of gender identity. This suggests that personhood recognised, and even emphasised, bodily difference according to varied contexts as well as changes throughout life. Two core themes in the materialisation of bodies are explored further: the potential for bodies to be divided and reconfigured, and the multiplicity of ways the body is represented within discrete contexts. Finally, the political significance of a model of personhood based on difference and mutability is discussed.

9.2 Personhood, age and gender

The intersection between personhood, age and gender is explored through integrating analyses of lived identity and funerary practices. The inclusion of nonadults in burial spaces and their similar post-mortem treatment strongly suggests that personhood was extended to even the youngest individuals. Incorporating the results of bioarchaeological analyses provides greater nuance to this finding. Skeletal evidence for advanced age is also briefly discussed, underlining the inclusivity of post-mortem treatment across the full extent of the life-course. The suggestion set out in §3.3.1, for contextual configurations of gender identity, is explored through a synthesis of the depositional and skeletal evidence alongside figurative representations. Altogether, there is little indication for bodily difference, based on either age or sex, as a structuring principle for treatment after death. Rather, a shared experience of changeable and shifting identity throughout life materialises through this analysis.

9.2.1 The treatment and role of nonadults

As discussed in Chapters 6 and 7, nonadult individuals from foetal to adolescent age comprise a significant percentage of the burial population at both Xemxija and Xagħra. Nonadults represent 29% of the identified burial population from the Xemxija Tombs (see §6.2.2), 17% of the Xagħra rock-cut tomb and 45% of the Xagħra hypogeum (Stoddart, Barber *et al.* 2009, 320–321). The demographic of nonadults at the Xemxija Tombs is dominated by perinates and infants relative to other age categories (see Figure 6.3), and they are similarly well-represented at Xagħra. These results appear to contrast the hypothesis that infant bones are more prone to degradation (Guy *et al.* 1997). Significantly, deathways do not seem to be restricted according to age. At Xemxija, nonadult and adult remains were weathered and abraded, and element representation suggests the removal of bones from individuals of all ages (although adult bones may have been selected more often, see §6.4). At the Circle, the sequence of primary deposition and subsequent partial or full disarticulation was carried out regardless of age (see §7.8). Such uniformity of depositional treatment demonstrates the *social* incorporation of young individuals.

Recent bioarchaeological analyses of the Xagħra Circle population, focused on dental pathology and modification, have observed both affected permanent and deciduous dentition. The element incidence rate of linear enamel hypoplasia is calculated at 6.8% on a sample of the population (Power, Mercieca-Spiteri and Irish forthcoming). Of 209 teeth presenting hypoplastic defects, 33 were deciduous (15.8%) and most date to late Tarxien contexts (783, 960, 1206). This accords with the overall results, suggesting an increase in non-specific stress indicators over time, which affected expectant mothers and young children. Additionally, both passive and active modification of permanent and deciduous anterior dentition is evident; of 172 incidences of dental modification, 18 are on deciduous teeth (10.5%) (Power, Mercieca-Spiteri, McLaughlin *et al.* forthcoming). Passive modification, in the form of chipping, notching and undulating incisal profiles, is attributed to activity-related wear. The modification of deciduous incisors, which are fully erupted by approximately 1.5 years and replaced by permanent dentition between 6.5–8.5 years (AlQahtani *et al.* 2010), unequivocally shows that some children's bodies were exposed to repeated, habitual labour from a young age. In this case, processing of fibres is inferred to have been carried out by adults and children alike.

These results have important implications for understanding the lived experiences of children in 3rd millennium BC Malta. Physiological and psychological stress increasingly affected individuals of all ages in the later Tarxien phase and children were involved in craft activities which resulted in visible dental wear. That children would have contributed to society is perhaps to be expected, given ethnographic and cross-cultural studies noting the significance of child labour in intensively agricultural and pastoral societies (e.g. Bradley 1993; Ember and Cunnar 2015). The physical signs of labour are typically not noted in the bioarchaeological literature, however, obscuring the evidence for such embodied experiences. Cross-cultural ethnographic analyses have revealed an increase in children's work between 6–10 years of age and almost identical tasks to adults from 10 years of age (Bradley 1993; Ember and Cunnar 2015). Compared with these examples, some children participated in socio-economic activities relatively early in life in Neolithic Malta.

In contrast to the widespread exclusion of young individuals in burial contexts across Europe in the 4th–3rd millennium BC (see §3.4.2), the similar treatment of adults and nonadults at the Xemxija Tombs and Xagħra Circle illustrates a distinct conception of age and ageing in Neolithic Malta. With new evidence demonstrating that children were gradually incorporated into socio-economic activities, potentially from as young as 6 years old, further light is shed on the deposition of nonadults. The deposition of an adolescent at the base of 97E/112N in context (783), discussed in §7.5.2.6, is reminiscent of the sequence in the Shrine and North bone pit, both initiated by male adult/s (Malone and Stoddart 2009, 366). Thus, reconceptualising the biocultural construction of age suggests that this individual, whose depositional position was cited by later interments, was socially recognised as a person in the full sense of the word.

It follows that, in death at least, personhood was therefore attributed to all individuals. New evidence for the involvement of young children in craft activities suggests the gradual incorporation of some young individuals into skilled labour. This may have been a slow process, depending upon the skills of those caring for the young, or the level of interest and competency expressed by children. The acceptance of developing capacities and potential throughout early life suggests that different qualities or contextual capacities shaped identity throughout the life-course.

9.2.2 Ageing and seniority

Previous syntheses of the burial population of the Xagħra Circle have particularly highlighted the position and role of adult male individuals who initiated the depositional sequence in several locations and largely remained intact and articulated (Malone and Stoddart 2009, 366). As a result, it has been suggested that they held seniority through roles, such as ritual specialists or elites, which designated them for distinct treatment (see §2.4). As already argued, social roles and status are complex to infer through funerary practices alone. Instead, I suggested in §8.5 that factors such as material resources and wealth, and the presence and motivation of kin, were more likely to have influenced post-mortem treatment. However, figurines most regularly represent fully-developed adult bodies, suggesting at least an ideological emphasis on the qualities of adulthood (see §3.3.2).

Skeletal indicators of ageing reveal the presence even of elderly individuals within the Xagħra Circle skeletal assemblage. Several cases of Hyperostosis Frontalis Interna (HFI) have been recorded on fragmented frontal bones (R. K. Power pers. comm.). HFI is most commonly found in post-menopausal women, suggesting its relationship to hormonal changes typically experienced during late adulthood (Hershkovitz *et al.* 1999). It is rarely observed in prehistoric populations, though two cases of HFI in women >50 years old were recorded from the Neolithic hypogeum of Boileau in France (Devriendt *et al.* 2004). Such results demonstrate the fully inclusive nature of collective deposition in Neolithic Malta. Age did not strongly influence the form of post-mortem rites, with both very young and very old individuals subject to deposition and disarticulation. However, the social construction of ageing at this later junction in the life-course requires more future work (see §3.3.2) to better characterise its intersection with personhood in Neolithic Malta and beyond.

9.2.3 Gender

The significance of nonadults in the burial space provides an important critique to hypotheses of male ancestors and elites. Additionally, although not included in this study, the Xagħra Circle hypogeum contains notable semi-articulated female individuals, who were omitted from such interpretations. These include the upper body of a female with periodontal disease from the West niche, a female with thoracic and lumbar osteoarthritis from the Display zone, an old adult female from the double burial in the East Cave, a female deposited in a pit in the East Cave, a female suggested to have Reiter's syndrome deposited in a pit in the lower Shrine, and an old adult woman with a cowrie shell headdress in the lower Shrine (Stoddart, Barber *et al.* 2009). Overall, the ratio of identifiably male to female individuals is almost equal, although it has not been investigated spatially or chronologically. Present evidence therefore indicates that deathways were not differentiated according to biological sex, and this is critical for understanding how gender was constructed and shaped. Indeed, biological features generally do not seem to have affected funerary practices. Rather, post-mortem treatment presumably related more closely to personal biographies which were negotiated through choices made by those returning to the burial space.

Gender appears similarly ambiguous and indistinct through bioarchaeological analyses. Differences in physical activity and labour relating to biological sex have been discerned in Neolithic populations from central Europe and Italy, with implications for gendered activities (see §3.3.1). Among the Xagħra Circle population, however, no significant distinctions in humerus robusticity were found (Parkinson 2019). While it would be ideal to supplement these results through analyses of individuals from other Maltese burial sites, as well as earlier and later populations, it does at least demonstrate that physical activities involving repetitive use of the upper limbs were not divided according to biological sex among populations around the Xagħra plateau during the Tarxien phase.

The ways in which sex and gender structured activities and social relations are thus not clear. Bioarchaeological and taphonomic evidence certainly suggest that some aspects of social life were not rigidly structured according to these features. The abundance of sexually ambiguous figurines is therefore especially pertinent. Some smaller figurines are clearly female, depicting breasts and pregnancy (see Figure 3.6), and some figurines and carvings represent disembodied phalli (Figures 9.1–9.2). Often, however, these aspects of bodily difference are not portrayed, giving the impression that gender identity was not always performed in response to, or arising from, biological sex.

This analysis illustrates the divergence between Malta and the central Mediterranean. As has been previously argued (Robb 2001), Maltese identity did not develop in isolation, as ongoing involvement in trade across the central Mediterranean is clear. However, gender distinctions were increasingly materialised and emphasised in late Neolithic and Copper Age Italy, and have been argued to give rise to a system of hierarchy based on prestige (Robb 1994, 2007). Bioarchaeological and material evidence demonstrates that a concern for gender-based difference was lacking in Neolithic Malta, and its construction and performance is therefore difficult to grasp. Its failure to emerge clearly through distinctions in funerary treatment, aspects of habitual behaviour, and representations of the body, shows similarities with the evidence across much of Neolithic Europe. With little to suggest a correlation between biological sex and gender identity, gender was probably performed contextually, through certain fields of action or in specific social relations. Moreover, instead of drawing on the external surface of the body, gender may have largely been conceptualised and materialised through substances and internal aspects of the body.

Contextual evidence shows little bias in the mode of treatment after death or representation of individuals based upon age or sex. Perhaps the only clear distinction that may be drawn is the emphasis on adults apparent through figurines. Thus, personhood was extended to all individuals, though its qualities or affordances may have shifted as the capacities of bodies themselves—perhaps both externally and internally—changed. Such fluidity in identity was continuous, as personhood was reformulated in numerous ways over a long period post-mortem. This is expanded upon below.

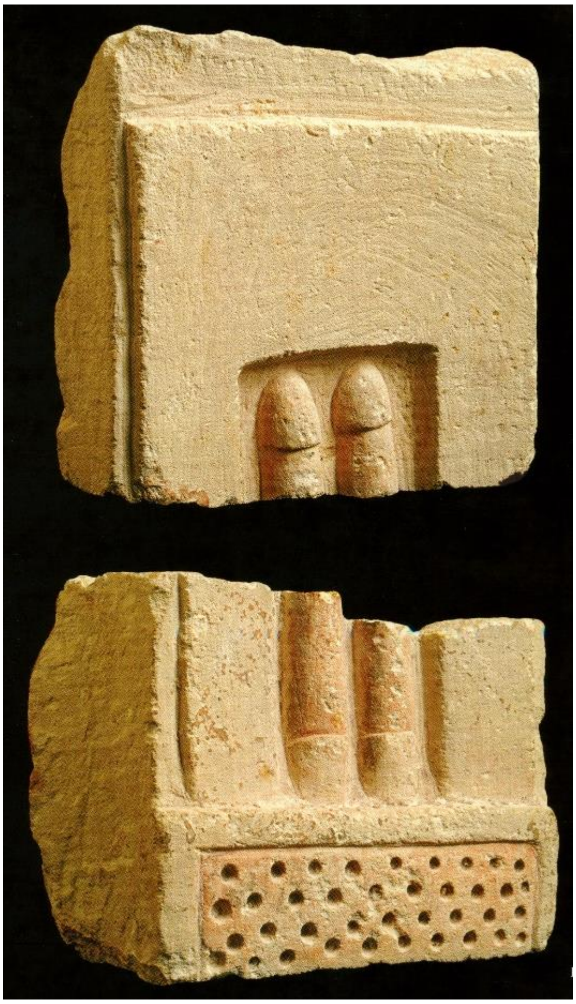

Figure 9.1: Stone phallic shrine with traces of ochre from Tarxien temple (Vella Gregory and Cilia 2005, 167) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

Figure 9.2: Freestanding phallic shrine with ochre traces from Tarxien temple (Vella Gregory and Cilia 2005, 164) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

9.3 Bodies from the life-course to the death-course

Although distinct facets of identity are foregrounded through different media, for example singularity and adulthood are emphasised in figurines, and collectivity and inclusivity underlined through funerary practices, two central ways in which bodily ontologies were shaped emerge from multiple lines of evidence. Firstly, bodies were divisible and partible, with the potential of the body to be broken down into its constituent parts regularly exploited. Skeletal and artefactual evidence for disarticulation and fragmentation consistently emphasises the head and limbs. Secondly, bodily difference is accentuated through the stylistically diverse corpus of figurines, and emerging evidence for intentional dental modification reveals ways in which identity may have been signified corporeally. Bodies in Neolithic Malta were evidently not bounded entities. Inferences regarding lived experiences and gender identity, as well as post-mortem treatment, highlight continually changing bodies, suggesting personhood was founded on an understanding on difference and distinction. Such potential for change extended into the death-course; bodies were reconfigured in varied ways which altered the perceived identity and agency of the dead.

9.3.1 Partibility and divisibility

As described in Chapter 8, the sequence of disarticulation was often focussed on separating the head and limbs from the torso. Where contextual records could be examined, a distinctive residual signature was identified, constituting the thoracic region in anatomical connection. The elements which were removed were occasionally re-deposited in clusters. Cranial caches featured throughout the Xagħra Circle; several contexts revealed an emphasis on cranial curation and, in (951), observations during excavation also noted discrete areas of other elements, including loose teeth (Stoddart, Malone *et al.* 2009, 137). Stacks of crania and long bones were observed in Bur Mgħez cave (Tagliaferro 1911, 1912), and element representation indicates that some long bones were removed from the Xemxija Tombs.

Striking similarities are observed among the corpus of anthropomorphic figurines, as discussed in §3.2.3. The fragmentation of heads and limbs, the interchangeability of heads on some (Figure 9.3), and the modelling of either partial bodies or body parts, all speak to a symmetry between the representation of lived and idealised dynamic bodies and the configuration of the dead. If, indeed, some figurines were made in the knowledge that they would break, it is possible that the unmaking of both clay bodies and the bodies of the dead were practices that developed alongside each other. This is further illustrated by two torso figurines (Figures 3.6b and c) which highlight a preoccupation with the relationship between flesh and bone. The front of the figurine depicts a heavily pregnant woman, while vertebrae and ribs are incised on the posterior. This references the residual signature discussed above, interpreted as one of the last stages of ‘unmaking’ the dead body, revealing an embodied knowledge about the process of death. As with similar examples from Çatalhöyük (Pearson and Meskell 2014, 237), these figures depict the precarity of life and reveal the ways bodies were both made and unmade across the life-course and death-course.

Figurines' heads were often carved with care and detail: facial features, expressions and hairstyles are typically distinctive and individualised (Vella Gregory and Cilia 2005, 149; Malone and Stoddart 2017, 735). Some figures are depicted with headdresses, comparable to the ochre-covered cowrie shell headdress preserved on an individual from the Xagħra hypogeum (Figures 9.4–9.5). Furthermore, if children were the creators or recipients of the smallest figurines, as suggested by Malone (2008), this could have been a crucial way in which they learned cultural conceptions of the body, as faces are especially emphasised on these objects (see Figure 3.7b). The curation and display of crania and skulls may be understood as a way in which the identity of the deceased was transformed, from remembered individuals to symbolic persons (cf. Kuijt 2008). Given the interchangeable heads on sexually ambiguous figurines, we might suggest that gender and other facets of identity were signalled through the adornment or modification of facial features or hairstyles. The intentional modification of anterior teeth in late Tarxien contexts may support this interpretation, indicating that aspects of individual identity or group affinity were inscribed bodily (Power, Mercieca-Spiteri, McLaughlin *et al.* forthcoming).

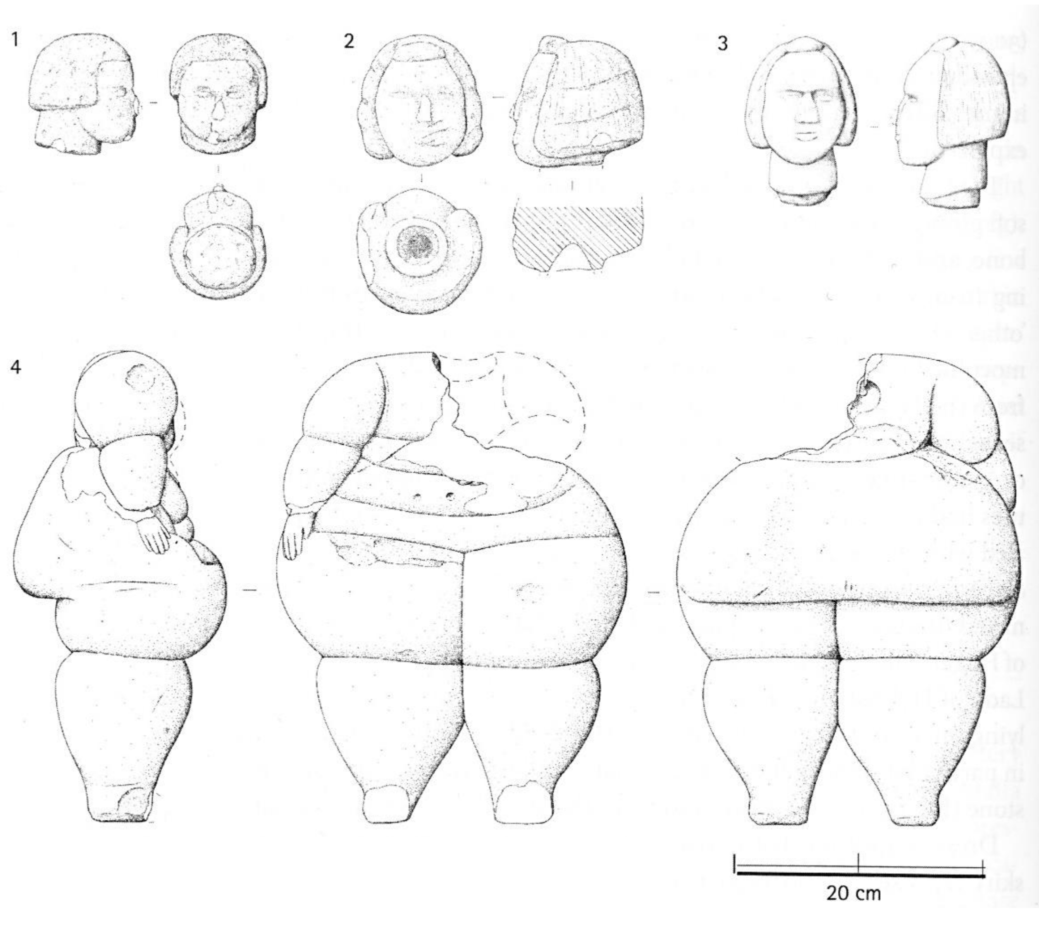

Figure 9.3: Large figurines with interchangeable heads. 1: Stone head from Ġgantija; 2, 3: Stone head from Ħal Saflieni; 4: Stone figure from Ħal Saflieni, from Malone and Stoddart 2017, 736. © Caroline Malone and Simon Stoddart, reproduced with the permission of Caroline Malone.

Figure 9.4: Old adult female skeleton from (1268) in the Shrine with cowrie shell headdress and ochre staining (described in Stoddart, Barber *et al.*, 2009, 355. Photo from BRX archive).

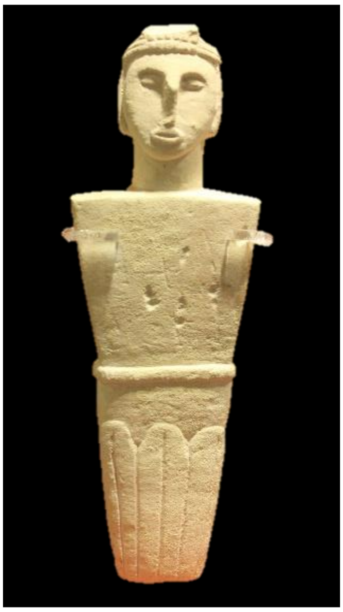

Figure 9.5: A figure from the 'shaman's bundle' (photo by author).

The relationship between the divisibility of clay and limestone figures and the bodies of the dead can be extended further, observing similar practices through the curation and breakage of ceramics. A large percentage of ceramic material from the Xagħra rock-cut tomb dates to the Żebbuġ, originally providing the *terminus post quem*. However, with deposition now dated to the Ġgantija phase, it appears that Żebbuġ pots were curated and reserved for funerary deposition. The practice of curating these objects directly references the curation of the dead. Moreover, Trump (in Malone *et al.* 1995, 312) noted that many sherds from the tomb could not be refitted, leading him to suggest that incomplete pots were deposited. While I do not wish to argue for a homologous understanding of clay and flesh in the Maltese Neolithic context (as has been argued for other regions of Neolithic Europe), the curation and breakage of a variety of media demonstrates the significance of these practices in constructing social relations and ideas about the body and history.

Reconfiguring the body and its parts through complex sequences of post-mortem interaction represents one sphere of action through which bodies and persons were composed. The importance of breaking down dead bodies, figurines and ceramics, often in a structured and careful manner, suggests that divisibility and partibility extended to understandings of the lived body. As discussed in §3.2.1, partible and unbounded bodies do not always, or solely, indicate dividual conceptions of personhood (see Brittain and Harris 2010). In some places, disarticulating and fragmenting the dead exemplifies the release of substances, relating to an ontology of permeability. However, in the context of late Neolithic Malta, bodies appear unstable across diverse modes. While some figurines, in most contexts, are partible and distributed, some remain complete, presumably with more fixed identities. The same is true of dead bodies, in the Xagħra Circle at least, where contextual evidence illustrates post-mortem pathways of undisturbed depositions, partially-disarticulated, and fully disarticulated remains. As such, aspects of both individuality and relationality are expressed in a range of contexts. Beyond merely focussing on parts and substances as key modes of configuring personhood, the changing nature and capacity of the body was significant in this region.

9.3.2 Multiple and scalar bodies

The above discussion has argued that corporeal difference was central to personhood in late Neolithic Malta. Throughout the life-course, and depending upon contexts and relations, bodies could appear differently or accentuate distinct qualities. Such fluidity could have been performed in a number of ways. The partibility and mutability of figurines, as well as the importance placed on drawing the remains of the dead into relations with other dead persons indicates personhood was both composed and altered relationally. The ability to incorporate aspects of others' identity allowed different affordances to come to the fore according to circumstance. Furthermore, the lack of clear gender identity inscribed on the surface of the body suggests that substances played an important role in composing persons. Therefore, the sharing of substances with others provided another means by which persons were multiply-authored.

In death, the range of ways to engage with the body was somewhat restricted; however, these actions were often realised variably. Interactions with the dead continued to emphasise partibility and difference, similar to lived bodies. Burial deposits also moved and shifted of their own accord, with natural forces responsible for effecting changes in the positioning and appearance of the remains of the dead. Moreover, the potential for change may not have stopped at the skin. A series of figurines often referred to as 'different' and 'other' blur the boundaries between humans and animals (Malone and Stoddart 2017, 748; Vella Gregory and Cilia 2005, 165), at least conceptually acknowledging the possibility of shared affordances across beings (Figures 9.6–9.7). The modification of the body was therefore constant, and the multiplicity of corporealities translated into death. Across multiple media, a coherent ontology of multiplicity and difference emerges.

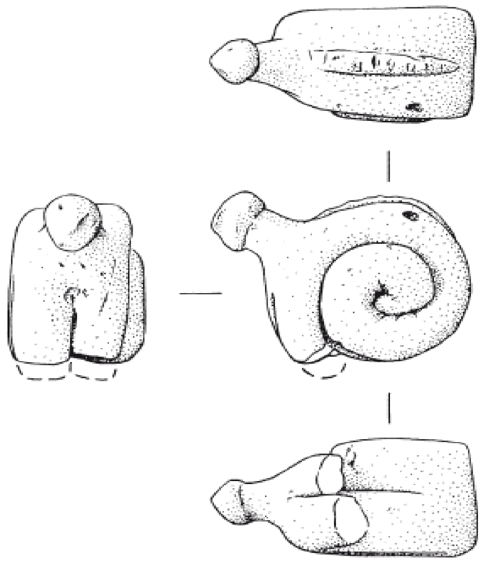

Figure 9.6: Terracotta snail with a human head, from the Xagħra Circle (Malone *et al.* 2009, 307. Drawn by Steven Ashley). Reproduced with the permission of Anthony Bonanno.

Figure 9.7: Clay figurine perhaps representing a human head on an animal form, from Ħaġar Qim (Vella Gregory and Cilia 2005, 17) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

Inferring that individuals could be multiply-authored reframes our understanding of body parts, acknowledging a continuity of modes of personhood across scales. Parts could therefore signify multiples, recalling individuals as well as the interpenetration of individual and community. This, in turn, has implications for theorising collectivity. The presence of both indivisible and divisible bodies in discrete contexts (i.e. burial spaces, figurines from the same site), scales up this difference from the individual to the group, or corporate level. The contemporaneous expression of 'wholeness' and partibility referenced the communal structure, as composed by numerous individuals performing different aspects of their identity.

Across scales, therefore, the balance of parts and wholes expressed a fractal or composite logic. For example, the Xagħra North bone pit integrated remains in various states of dis/articulation, which were carefully selected, presumably during clearance of the hypogeum. The deposit was slowly built up over several generations, incorporating fully and partially disarticulated remains, as well as curated fragmented crania (Malone *et al.* 2019; Stoddart, Malone *et al.* 2009, 117). The composition of the pit thereby represents the hypogeum in microcosm: a history of bodies in their varied forms. Cranial clusters may be similarly reconceptualised; they not only encapsulated significant individuals but referenced the persons which were authored by and through such individuals, emphasising multiscalar identity. Fragments, bones, and articulated bodies accentuated the multiple dimensions and relations through which the body was composed. Their associations and relations in the burial assemblage reinforced notions of scalar identity, producing an effect larger than themselves.

It has repeatedly been argued that Neolithic bodies expounded difference (Bailey 2005; Borić *et al.* 2013; Robb and Harris 2018). Bodies in Neolithic Malta, as distinct and changeable entities, were recognisably 'Neolithic'. Yet, points of regional distinction are clear. Firstly, the inclusive nature of personhood and funerary practices notably contrasts the intentional under-representation of infants in many areas of Neolithic Europe. Secondly, the history of the body was significant, with some of the most prolonged mortuary practices and largest burial sites in Europe. Thirdly, similarly careful configurations of the body in life and death are discerned, indicating a holistic bodily ontology. Finally, whereas correlations have often been drawn between stone and the ancestors (Parker Pearson and Ramilisonina 1998; Robb 2009), such a metaphor may not hold in Malta. In the 'stone world' (Tilley 2004) of Malta, the qualities of stone may have provided an appropriate material to think through the body. Limestone was regularly used to both represent and contain bodies, and Globigerina limestone is particularly evocative, visibly ageing and changing. Stone was thus recognisably a 'living' material. This quality is exemplified in the carving of a human head into a stalagmite (Figure 9.8).

Figure 9.8: Human face carved into a stalagmite, from Tarxien temple (Vella Gregory and Cilia 2005, 158) © Daniel Cilia. Reproduced with the permission of Daniel Cilia.

9.4 The politics of personhood in late Neolithic Malta

As a final stop on this journey, I'd like to briefly consider the wider significance of the argument presented in this chapter. Bodies, personhood, agency and gender are all deeply political and *politicised* phenomena. Asserting that personhood was inclusive and founded on difference, and that bodies could be performed in a multiplicity of ways, has implications for our vision of politics and social life in late Neolithic Malta.

Firstly, the spatial and temporal analysis of deathways, presented in Chapter 8, is revealing. The use of many areas of the hypogeum for multiple funerary practices (see §8.3) indicates that spaces were often not restricted according to specific stages of the process and, if they were, these were not firm structuring principles (Thompson *et al.* in press). Such flexibility suggests the site was accessible to multiple kin groups and communities, especially when used intensively during the mid-Tarxien phase. Widely shared access to the hypogeum challenges earlier arguments which posited restricted access based on emergent hierarchy or a 'democratic elite' (Stoddart and Malone 2015). It is unsurprising that successive generations of relatively small communities would produce such a varied burial assemblage (cf. Keesing & Haug 2012), which appears to maintain similar foundations and practices over centuries, yet with seemingly few strong trends (Thompson *et al.* in press). Collective deposition formed an arena which both materialised and facilitated a more heterarchical scheme of social organisation. The long-term continuity of practices of primary deposition and disarticulation—as with monument construction, lasting more than a millennium—speaks to the success and resilience of this system. Only toward the late Tarxien, when pit depositions increased and revisiting and manipulating the dead declined (see §8.4), might we begin to see factionalism and social fragmentation.

Key to this transformative understanding is the recognition of social inclusivity (the extension of personhood to young babies and children) and bodily difference (including changing capacities for gender identity and the incorporation of multiple relations). Both arguably served political functions. The cultural sanctioning of difference was a key means through which community was sustained without the detrimental effects of competition for status (e.g. see Robb 2007b, 340–341). Previous discussion has considered "the dialectic relationship of the person and the corporate social group" in this context (Skeates 2010, 235). However, conceptualising people as nested scales of others deepens this understanding. Heterarchy, encompassing different but equal individuals, was founded upon an ontology of composite or fractal personhood. This both emphasised and reproduced the integral relations between individuals and social aggregates.

In addition to underpinning the long-term practice of collective deposition, which connected the dead across social groups and centuries, this strategy facilitated the co-operative sharing of resources which worked to offset ecological and environmental fragility (McLaughlin *et al.* 2018). Heterarchy and co-operation are increasingly recognised as important political strategies for maintaining social equilibrium on the Maltese islands (Cazzella and Recchia 2015; Grima 2008; McLaughlin *et al.* 2018; Vella 2016). Widespread and long-term evidence for collective monumental building projects, each with distinct features and decorations, speaks to the maintenance of interdependent communities (Cazzella and Recchia 2015; Vella 2016). Construction, as well as long-distance travel, trade, and ritual, all required significant skills and knowledge. While much discourse has focussed on the role of ritual and 'ritual elites' in the islands (e.g. Bonanno 2014; Robb 2001; Stoddart *et al.* 1993), this may be overstated. Short-term and context-specific forms of authority seem more likely. Though such a system would have fluctuated over time, it would also have incorporated significant internal complexity (cf. DeMarrais 2016).

From the large burial populations of the Xagħra Circle and the Xemxija Tombs, relatively few incidences of trauma and interpersonal violence have been observed (Power, Mercieca-Spiteri, Thompson *et al.* forthcoming). Collective burial sites therefore not only tangibly located long-term ancestry in the landscape, providing fixed points for at least semi-mobile populations, they also transmitted powerful messages about personhood, communal identity, social cohesion, remembrance, and resilience. While there are evident fluctuations and diversity in practices throughout the late Neolithic, collective depositions are revealing of the integral relations between persons and communities across scales, illustrating one sphere through which social resilience (see McLaughlin *et al.* 2018) was manifested in the Maltese islands. Central as they were to the reproduction of heterarchical social dynamics, the dead as a collective entity may be understood as a *coalition*.

CHAPTER TEN

CONCLUSIONS

'Mma Ramotswe shuddered. It was one thing to handle bone, but to handle human tissue was quite a different matter.'
—Alexander McCall Smith, 'The No.1 Ladies' Detective Agency' (1998, 175–6).

10.1 Key findings

This research has carried out the first large-scale application of taphonomic analysis to Maltese Neolithic burial assemblages, revealing a greater variability in depositional modes than previously realised and finding a striking longevity to practices of primary deposition and subsequent disarticulation. This study has achieved the first comparative analysis of a contemporary assemblage to the Xagħra Circle, recording the material excavated by Evans (1971) from six rock-cut tombs at Xemxija. The application of these methods to the Xagħra Circle, with good excavation recording, provides a baseline from which to consider not just the Xemxija Tombs assemblage, which lacks such data, but to undertake comparative analyses of other assemblages without spatial and stratigraphic detail. A large dataset has been established through implementing a standard protocol and methodology, allowing future analyses to be compared to these findings. The taphonomic results have been placed within the context of lived experiences, bodily praxis, and representations of the body, putting forward a new interpretation of personhood and the body in late Neolithic Malta. The integration of method and theory in this analysis sets the agenda for future studies of bodily ontologies and personhood in other regions and periods, illustrating the significant insights to be gained from a holistic approach.

10.1.1 Variation in deathways

The initial study of the Xagħra Circle assemblage stated that "the only comprehensive way of analysing the deposit is as a series of disarticulated fragments" (Stoddart, Barber *et al.* 2009, 316). Sustained analysis of *in situ* articulation, particularly within context (783), demonstrated that it is possible to examine the deposit from an archaeothanatological perspective. Patterns of articulation in 97E/112N revealed sequential disarticulation (§7.5.2.6), further supported through analysis of nonadult individuals in context (1206) (§7.5.3.6). Curation is evident in the form of cranial caching in several areas, and there is clear over-representation of long bones in context (656) in the Southwest niche. These findings reveal that the process of disarticulation was often careful, resulting in the preservation of the axial skeleton, which forms a distinct residual signature. On occasion, a paradoxical order of disarticulation (see Maureille & Sellier

1996) is evident, suggesting that some post-mortem engagements involved the manipulation of the dead in partially fleshed, decomposing states. The absence of cutmarks remains difficult to understand, though cannot be entirely attributed to poor cortical surface preservation (as bone cortices are notably better preserved at Xagħra than Xemxija, see §8.2.1). As has been noted with reference to secondary burial practices in sub-Saharan Africa, these actions require "considerable anatomical knowledge and autopsy skill" (Insoll 2015, 161). This challenges suggestions that death and decomposition were considered polluting in this context (Skeates 2010, 223). It is evident that at least certain individuals were knowledgeable about the process of decomposition, as well as anatomy, and this knowledge was used to intervene with and manipulate the remains of the dead.

In addition to this structured sequence of disarticulation, or 'unmaking' the dead, the first observations of beetle modification, rodent gnawing, and charred bone were reported. In the Xemxija Tombs assemblage, pits, bores and furrows produced by dermestid beetles were most evident on cranial and long bone fragments, including along fragmentation margins (§6.3.6.2). These modifications are most consistent with the transportation of dermestid larvae into the tombs, perhaps in hide shrouds, although it cannot be excluded that they accessed decomposing remains on the surface. Rodent gnawing was observed on 14 fragments, mostly long bone diaphyses, indicating the rare exposure of elements and/or access to the tombs by scavengers (§6.3.6.1). Charring was observed on 36 fragments, demonstrating the occasional presence of open flames within the tombs (§6.3.5). From the Xagħra Circle, four cases of dermestid beetle modification were observed, as well as weathered and charred bone. Pits consistent with dermestid tunnelling were evident on two long bones from context (276) in the rock-cut tomb (§7.3.6) and a further two long bones from the articulated male the North bone pit (§7.4.6), suggesting their transportation into the pit through organic wrapping materials. Charred bones from context (326) in the East chamber of the rock-cut tomb, the Shrine and the Display zone, indicate the occasional proximity of skeletal remains to an open flame. This supports analyses which have shown the hypogeum was often experienced in darkness (Stoddart *et al.* 2019), although the use of fire may have also had other, less functional, purposes.

A core distinction between the Xagħra Circle and Xemxija Tombs is the extent to which bones were circulated. Various contexts from the Circle demonstrate selective re-deposition of elements, suggesting both small- and large-scale clearance of spaces within the hypogeum. At the Xemxija Tombs, however, element representation revealed a strongly residual curve, with small bones of the hands and feet representing the most prevalent elements. The general lack of crania and long bones has been suppressed by fragmentation and, while this is difficult to quantify, they account for such a low portion of the MNI that they appear to have been selectively removed from the tombs, presumably for circulation amongst kin.

Spatial and temporal analysis of the Xagħra Circle has altered understanding of the use and experience of space (see §8.3 and §8.4). Tracing funerary practices in overlying sequences of burial deposits shows that depositional modes were constantly changing. Larger spaces within the hypogeum seem to have been particularly reserved for primary deposition, although these were often also disturbed post-mortem. In addition, the hiatus of use at the Xagħra Circle, modelled between 3300–3000 cal BC (Malone *et al.* 2019), raises questions as to the presence of other burial sites in the surrounding landscape. Temporal analysis of funerary practices suggests that, from the early 3rd millennium BC, techniques of disarticulating the dead became more careful and structured.

Despite this dominant praxis for 'unmaking' the dead, however, questions remain as to how individuals culturally perceived to have died a 'bad death' may have been disposed of. Ethnographically, it is evident that most funerary practices are at least partially exclusionary according to a series of complex factors. The demographically inclusive nature of these burial sites—and the absence, to date, of any isolated incidences of burial variability—suggests that individuals who died in suspicious or violent circumstances may have been treated in alternative ways.

10.1.2 Dying as a process

Depositing the dead in late Neolithic Malta was not a simple, nor single, act. Most primary engagements with the dead involved their deposition soon after death but, in many cases, their fate was to be revisited and progressively disarticulated, potentially multiple times. Selected disarticulated elements were often re-deposited and occasionally grouped together. These practices further illustrate the recognition and selection of skeletal elements, supporting assertions of anatomical knowledge and indications that bones were selectively removed from the Xemxija Tombs for circulation in the landscape. The initial act of depositing a fleshed corpse was often not the final sight of the dead; instead, they were usually transformed through disarticulation and commingling with the remains of others—the past, present and future dead. As discussed above, disarticulation was sometimes carried out during advanced decomposition. The presence of soft tissue is often correlated with life and agency and may evoke difficult emotions (as the epigraph to this chapter illustrates); yet, in the Maltese context, relations were continued with both the decomposing dead and their bones.

As the predominant praxis was prolonged post-mortem manipulation, this challenges assumptions as to the role and significance of individuals who remained articulated and undisturbed (e.g. Malone and Stoddart 2009, 366; Stoddart and Malone 2015). Certain individuals and depositional events were cited through the similar placement and positioning of later interments (see §8.5). These acts reveal the remembrance of specific individuals who, over several generations, were revisited and interacted with. Their identity was slowly transformed over this period, such that eventually their presence no longer precipitated commemorative and citational depositional practices. This extended process structured the social death of the person. Such a prolonged ontological transformation of the dead, further sedimented through the longevity of use at many burial sites, may be almost unique in the context of Neolithic Europe.

10.1.3 Death and identity

Investigating post-mortem treatment according to facets of identity which could be assessed skeletally—specifically age and sex—revealed some significant findings regarding funerary practices and the construction of personhood. Previous research identified the nonadult demographic at the Xagħra Circle, comprising 17% of the rock-cut tomb and 45% of the hypogeum (Stoddart, Barber *et al.* 2009, 320–321). This study found that nonadults accounted for 29% of the preserved burial population from the Xemxija Tombs (§6.2.2). Although it is difficult to untangle the destructive effects of successive deposition from demographic fluctuations, recent temporal analysis of demography at the Xagħra Circle suggests that the burial record is strongly influenced by the age structure of the living population (Thompson *et al.* in press).

Moreover, the full range of funerary practices were accorded to individuals regardless of age. At the Xemxija Tombs, nonadults were treated in similar ways to adults, although their remains may have been removed from the tombs less often (see §6.4). At the Xagħra Circle, *in situ* articulation and analysis of skeletal completeness demonstrated that perinates and children were interred soon after death and followed the same varied deathways as adults: they could be left undisturbed or returned to for selective bone removal and disarticulation (see §7.8). The inclusion of perinates and infants at both sites, and in large numbers, is exceptional compared to collective deposition spaces across much of Neolithic Europe (see §9.2.1). Dental modification amongst some children from the Xagħra Circle hypogeum reveals their inclusion in crafting activities (Power, Mercieca-Spiteri, McLaughlin *et al.* forthcoming), suggesting they may also have contributed labour in other domains.

There is again little to suggest distinct treatment according to sex or gender, with both female and male individuals treated in a range of ways after deposition. Analysis of long bone biomechanics (Parkinson 2019) and figurines reveals ambiguity in gender identity, suggesting it may not have always been performed in relation to biological sex (see §9.2.3). Gender in Neolithic Malta might have drawn more heavily on the internal *substances* of the body, than its external physical differences, appearing contextually or relationally (following arguments by Robb and Harris 2018). Personhood was therefore notably inclusive in this island environment, but its qualities and performances may have shifted over the life-course, as people's capacity for action changed.

10.1.4 Heads, shoulders, knees and toes: bodies and personhood in Neolithic Malta

Funerary practices consistently emphasised a structured process of disarticulation, focussing on the head and the limbs. Combined with analysis of anthropomorphic figurines, and evidence for the fragmentation of curated ceramics, the emphasis on dividing and reconfiguring the body indicates an ontology of unbounded, partible bodies (see §9.3.1). While tongue-in-cheek, the title of this thesis has a deeper significance. Heads were important sites for displaying identity and were frequently selectively removed from skeletons and re-deposited in clusters. Shoulders point toward the residual signature of articulated thoracic regions, discussed above, representing the joints from which humeri were removed. Knees provide an important indicator of funerary practices, as a relatively robust small bone; they were over-represented in the full sample from the Display zone (Stoddart, Malone *et al.* 2009, 161) and in this study's sample from context (326). Toes, when present, usually illustrate primary deposition, and are notably over-represented in the Xemxija Tombs assemblage. However, the varied dimensions through which the body was understood are conveyed across multiple media and within discrete contexts. The co-presence of divisible and indivisible dead bodies and figurative bodies highlights corporeal difference and instability. The display of different bodily dimensions mirrors the acceptance of bodily difference across the life-course which is highlighted through inclusive funerary practices.

The similar forms through which both partibility and multidimensionality emerge across different contexts further indicates fractal or composite personhood. Composite personhood denotes the negotiation of identity across multiple scales, with individuals incorporating aspects of the lineage or corporate group, and the corporate group similarly able to present—through its integration of diversity—as an individual (Wagner 1991). Such an interpretation brings forth new perspectives at various scales, arguing for the greater significance of body parts and individual elements, as well as the communal group. This construction of personhood, founded on the recognition and sanctioning of difference, was integrally related to the functioning of a heterarchical society during the late Neolithic in Malta. Collective depositions, incorporating *all* bodies, in *all* of their forms, materialised this ontology.

10.2 Limitations of this research

This research met with several restrictions due to the scope and design of the project, and its association with the broader FRAGUS project. Furthermore, each assemblage presented different challenges. The sampling methodology for the Xagħra Circle assemblage was defined by the wider interests of the Population History Workgroup, to enable several lines of analysis to intersect. It was therefore necessary to prioritise specific contexts according to sampling for radiocarbon dates and isotopic analyses. Other areas of the hypogeum which might warrant future detailed research include contexts from the lower Shrine (although remains from context (1328) could not be located during this study), the west Niche, the East Cave, and more extensive investigation of the Deep zone. Although this study endeavoured to assess the relationship between funerary practices and age, it was difficult to investigate adulthood in detail. Ideally, more discrete adult individuals would have been recorded, but they proved difficult to fully locate in the NMA stores (as they were often spread across several boxes). In contrast, the lack of contextual and stratigraphic detail pertaining to the Xemxija Tombs assemblage has affected quantification and element representation analyses; results would almost certainly differ were it possible to analyse the contents of each individual tomb. Nevertheless, this study demonstrates the value in returning to archival material, as long as the methodology and sampling strategy remain flexible and results are reported considering such issues.

Methods were chosen to achieve maximum yield in study seasons of limited duration. Therefore, due to time constraints and the size of both assemblages, a high-resolution zonation method was not implemented. This may have raised the number of crania and long bones included in quantification but, due to the aggregation of the Xemxija Tombs assemblage and the partial sampling of many contexts from Xagħra, the MNI would have remained an under-estimate. Future analysis of other Neolithic Maltese burial assemblages should strive for more detailed zonation recording and, where possible, re-fitting of elements. On this note, such extensive fragmentation as encountered in these assemblages warrants the development of a more expedient method of refitting.

Consideration of human-animal relationships, outlined as an emerging area of research in Chapter 1, was not possible in this study. Most faunal remains were not spatially recorded at the Xagħra Circle and were curated separately. To date, they have only been approached from a functional perspective. However, observations made during excavation (i.e. the association between a male skull and boar skull in context (897), see Stoddart, Malone *et al.* 2009, 175) suggest a post-anthropocentric approach would provide further insights into ontology in Neolithic Malta.

10.3 Future directions

This research has defined the varied deathways employed at the Xagħra Circle and Xemxija Tombs, suggesting that social death was achieved through a prolonged series of post-mortem interactions which reformulated the identity of the dead. Deathways did not vary in relation to age or sex, and alongside further bioarchaeological and material evidence, bodies appear in multiple forms, illustrating the significance of difference to personhood in this region.

The approach taken in this research sets an agenda for future studies of bodily ontologies and personhood, in other periods and regions. As has long been recognised, mortuary rites represent the negotiation of identity in both life and death; as such, the treatment of the dead must be viewed through a broader lens. To do so, the modes through which bodies are represented and engaged in other spheres, such as material culture and physical activities, should be compared to explore points of convergence and dissonance. This reveals both widely-held and shared understandings as well as context-specific dimensions of bodily performance. In doing so, it is possible to move away from dualistic notions of personhood, and instead develop a more comprehensive understanding of bodily praxes. Moreover, this study paves the way for further research into the economic and political implications of personhood, an area which is often overlooked in other models of prehistoric personhood.

These results raise further questions and would benefit from additional research in numerous areas, including:

- Contextual and element representation analyses demonstrated that many areas of the Xagħra Circle contained disturbed primary depositions. It should therefore be possible to analyse a greater number of complete (or nearly complete) individuals than were included in the original study (Stoddart, Barber *et al.* 2009, 321–325). Use of the intra-site GIS might facilitate identification of more *in situ* articulations.
- Relatedly, this line of study could be integrated with bioarchaeological analysis to align the study of deathways with osteobiographies, providing greater detail on how lived experiences affected engagements with the dead.
- Considering kinship, relatedness and geographical affinity, through biomolecular analyses and studies of non-metric traits, would shed light on the intersection between personhood and ethnicity, and how this relates to social inclusivity and resilience.

- A paradoxical order of disarticulation was observed in several cases, demonstrating disarticulation while soft tissue was preserved. Elsewhere, such a pattern has been attributed to mummification through natural or artificial means (Maureille and Sellier 1996; Sellier and Bendezu-Sarmiento 2013). Future work applying histological analysis of bacterial bioerosion (e.g. Booth *et al.* 2015; Booth 2016) may shed more light on the timing of deposition.
- Viewed alongside emerging evidence for the socio-economic role of young children, a fuller engagement with the lived experiences and health status of young individuals is warranted. In particular, studies assessing weaning, childhood diet and health, and the cultural construction of age would provide further nuance to our understanding of population dynamics.
- Building upon this research through the study of contemporaneous assemblages, especially the Kerċem rock-cut tomb, and any surviving material from Ħal Saflieni, would facilitate a broader, macro-scale analysis of funerary practices on the islands.
- Interpretations of Neolithic Maltese funerary practices will be enhanced through further research into their wider central Mediterranean context. Taphonomic analysis is only recently being applied to Italian Neolithic and Copper Age burial assemblages (e.g. Bailo Modesti and Salerno 1998; Conti *et al.* 1997; Pische 2010; Robb *et al.* 2015). Taking a similarly holistic approach to bodies, through integrating funerary practices with material culture, would be especially beneficial.

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Appendix 1: Methods

1.1 Zonation method

Zone	Cranium	Mandible	Scapula	Vertebrae	Ossa Coxae	Long bones
1	R frontal	Corpus	Glenoid fossa	Centrum	Ilium	Proximal epiphysis
2	L frontal	L condyle	Body	Neural arch	Ischium	Proximal third
3	R parietal	R condyle	Acromion	Transverse process/es	Pubis	Middle third
4	L parietal	L coronoid	Coracoid process	Articular facet/s	Acetabulum	Distal third
5	Occipital	R coronoid	Spine	Spinous process	Auricular surface	Distal epiphysis
6	L temporal					
7	R temporal					
8	L sphenoid					
9	R sphenoid					
10	L zygoma					
11	R zygoma					
12	L maxilla					
13	R maxilla					
14	L nasal					
15	R nasal					

Table 1: Zones of the cranium, mandible, scapula, vertebrae, ossa coxae and long bones.

Zone	Tooth	Corpus sterni	Clavicle/ribs	Sacrum	Metacarpals /metatarsals/ phalanges	Patella/ carpals/ tarsals
1	Crown	Manubrium	Proximal	Midline	Proximal epiphysis	Entire element
2	Root	Corpus	Body	Right	Diaphysis	
3		Xiphoid process	Distal	Left	Distal epiphysis	

Table 2: Zones of the small bones and extremities.

350

1.2 Comparative site data

Element	West Tenter St	Spitalfields	Wharram Percy
Cranium	80.5	95.4	86.03
Mandible	65	85.6	77.29
Clavicle	45.5	67.9	70.67
Cervicals	52	-	68.66
Thoracics	58	-	66.79
Lumbars	58	-	63.87
Scapula	53	75.3	71.98
Sternum	24	62.9	55.17
Humerus	57	82.2	72.56
Radius	54.5	78.6	68.27
Ulna	61.5	76.4	67.83
Carpals	17	-	18.2
Metacarpals	50	-	42.29
Pelvis	66.5	91.6	75.55
Sacrum	59	75.3	64.48
Femur	59	90	70.16
Patella	26.5	-	26.56
Tibia	48.5	87.8	61.94
Fibula	32.5	73.2	55.53
Calcaneus	47	-	40.25
Talus	47	-	36.39
Tarsals	30	-	25.09
Metatarsals	41.5	-	33.23
Phalanges	24.0	-	-

Table 3: Skeletal element representation (BRI) data from Roman, Medieval and post-Medieval cemetery sites.

Element	Non Pa Wai	Kunji Cave	Nanjemoy	Scaloria	Poulnabrone	Poulawack	Parknabinnia	Quanterness	Tinkinswood
Cranium	22.0	97.0	42.75	59.09	65	100	65	93	55
Mandible	11.0	73.0	83.21	54.55	85	75	60	42	50
Clavicle	27.5	24.0	67.94	54.55	58	50	65	56	15
Cervicals	0	25.0	48.09	20.78	54	25	75	60	5.7
Thoracics	0	21.0	28.37	15.53	-	-	-	52	4.6
Lumbars	0	23.0	31.6	15.45	-	-	-	43	12
Scapula	11.0	67.0	71.37	36.36	80	75	68	50	10
Sternum	0	12.0	26.72	9.09	53	24	49	56	10
Humerus	33.0	38.5	92.37	52.27	39	50	68	54	30
Radius	44.0	37.5	66.41	45.45	35	62	68	65	20
Ulna	27.5	37.5	95.8	40.91	54	88	63	63	27.5
Carpals	1.0	4.5	19.17	1.14	42	22	38	39	0
Metacarpals	36.0	19.5	35.88	11.36	62	61	50	61	10
Pelvis	11.0	30.0	83.21	34.09	65	50	65	44	40
Sacrum	11.0	30.0	42.75	4.55	22	100	56	66	5
Femur	44.0	53.0	92.75	79.55	32	88	68	34	60
Patella	27.5	21.0	43.89	22.73	72	75	59	74	5
Tibia	66.5	31.5	90.08	40.91	39	99	62	33	30
Fibula	5.5	39.0	53.82	20.45	39	62	59	38	12.5
Calcaneus	11.0	21.0	58.4	20.45	-	-	-	75	30
Talus	49.5	30.0	52.29	36.36	-	-	-	66	17.5
Tarsals	7.0	12.5	38.24	8.18	55	56	37	63	1.5
Metatarsals	28.0	20.5	40.15	18.64	-	90	52	75	9.5
Phalanges	24.0	14.0	29.35	3.57	70	31	32	54	3.4

Table 4: Skeletal element representation (BRI) data from comparative multiple burial sites.

1.3 Database coding

Siding	
0	Unsideable
1	Left
2	Right
3	Axial
API & QBI (Bello 2005)	
0	0%
1	1–24%
2	25–50%
3	51–74%
4	75–99%
5	100%
Fragment size (Knüsel & Outram 2004)	
1	0–20mm
2	21–30mm
3	31–40mm
4	41–50mm
5	51–60mm
6	61–70mm
7	71–80mm
8	81–90mm
9	91–100mm
10	101mm+
Weathering (Behrensmeyer 1978)	
0	No modifications
1	Cracking
2	Flaking of outer layers
3	Rough, fibrous texture across most of bone surface
4	Weathering fully penetrates cortex, bone splintering
5	Bone falling apart *in situ*, large splinters
Abrasion and erosion (McKinley 2004a)	
0	No modifications
1	Slight and patchy erosion
2	Deeper surface erosion than stage 1
3	Most of bone affected by erosion
4	All of bone affected by erosion
5	Heavy erosion, masking normal surface morphology
Fragmentation morphology – angle, outline and texture (Outram 2001)	
0	Fresh fracture
1	Some dry fracture characteristics
2	Dry fracture

Table 5: Coding for taphonomic variables recorded in the Access database.

Appendix 2: Xemxija Tombs

2.1 Xemxija Tombs plan and section drawings

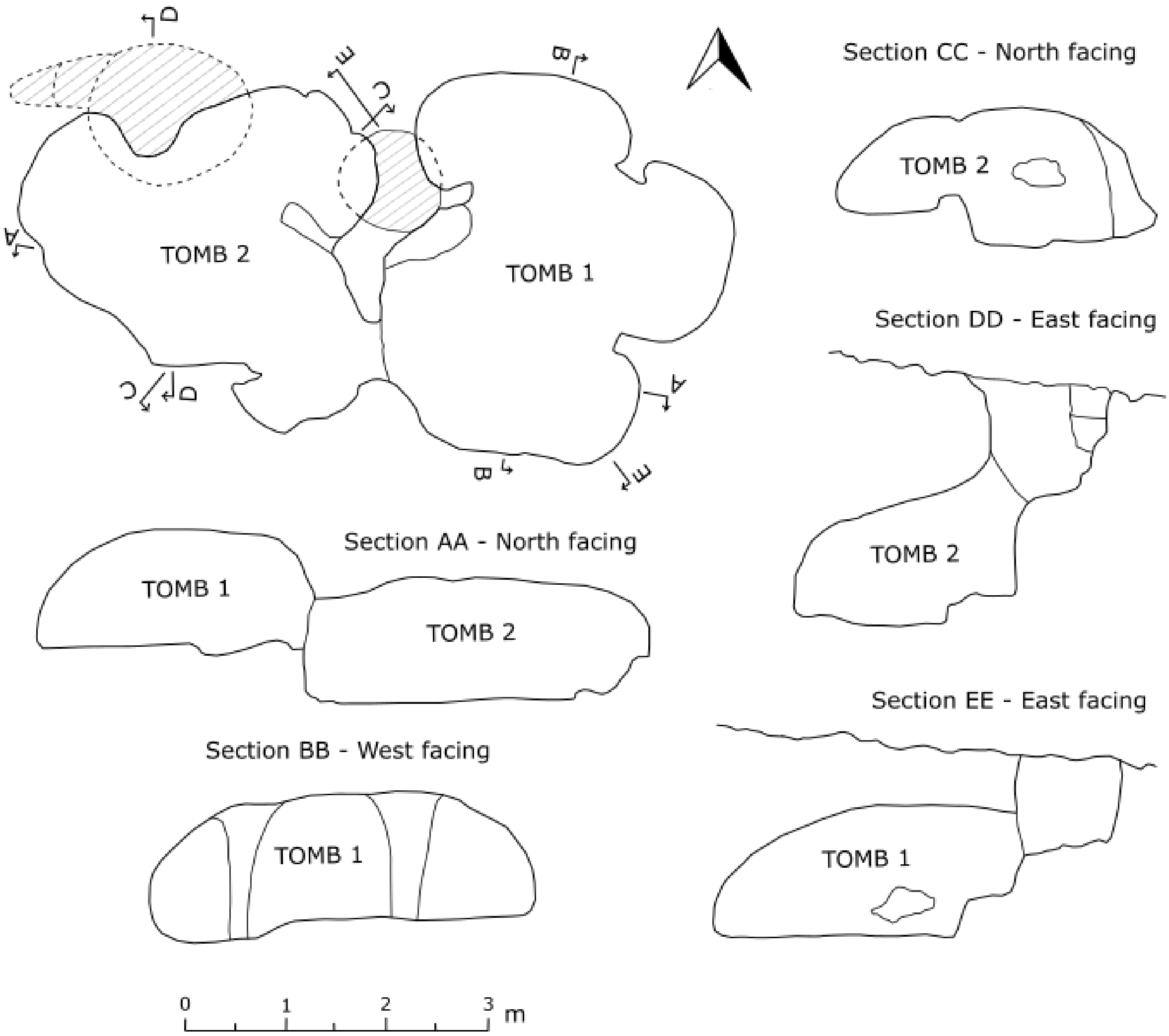

Figure 1: Plan and sections of Xemxija Tombs 1 and 2 (redrawn after Evans 1971).

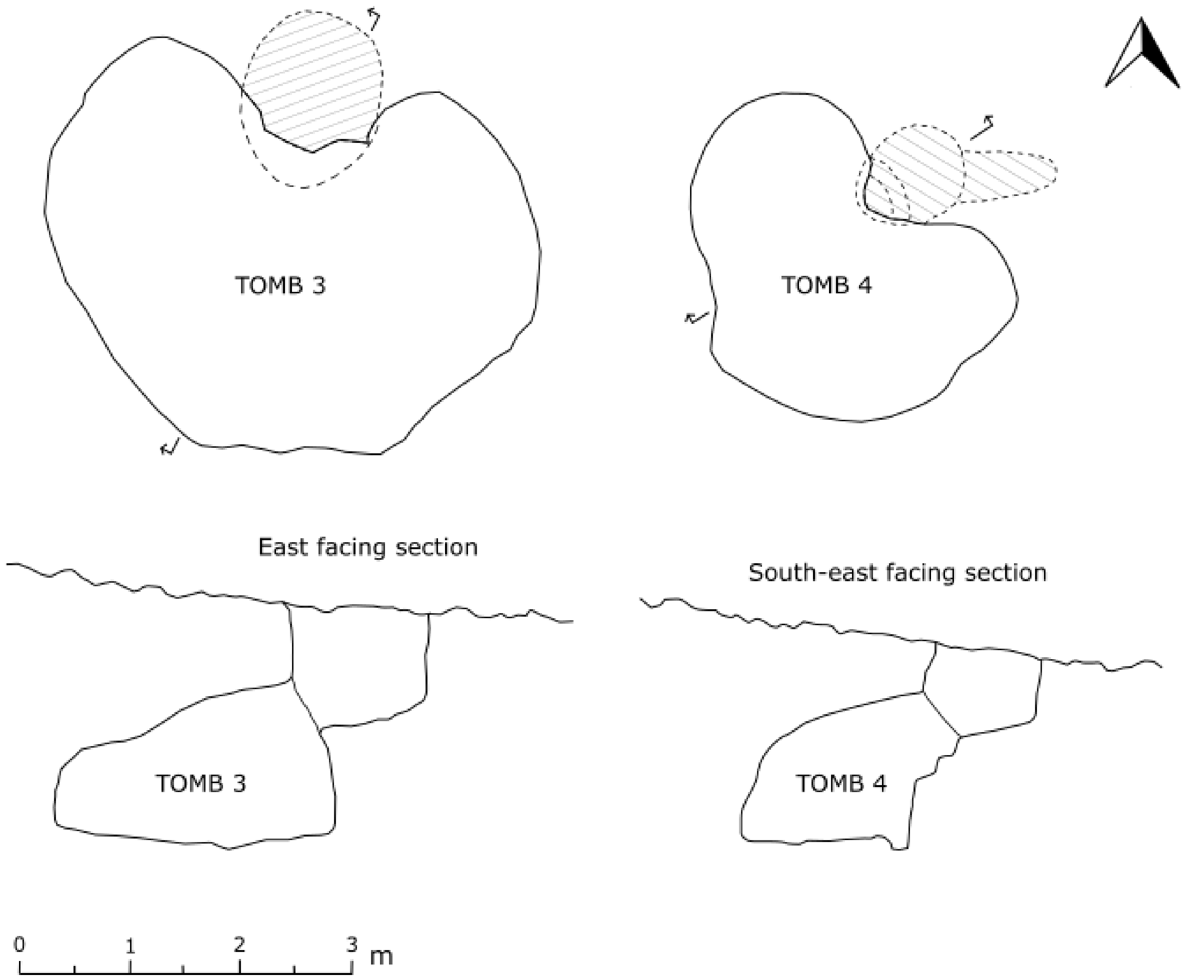

Figure 2: Plans and sections of Xemxija Tombs 3 and 4 (redrawn after Evans 1971).

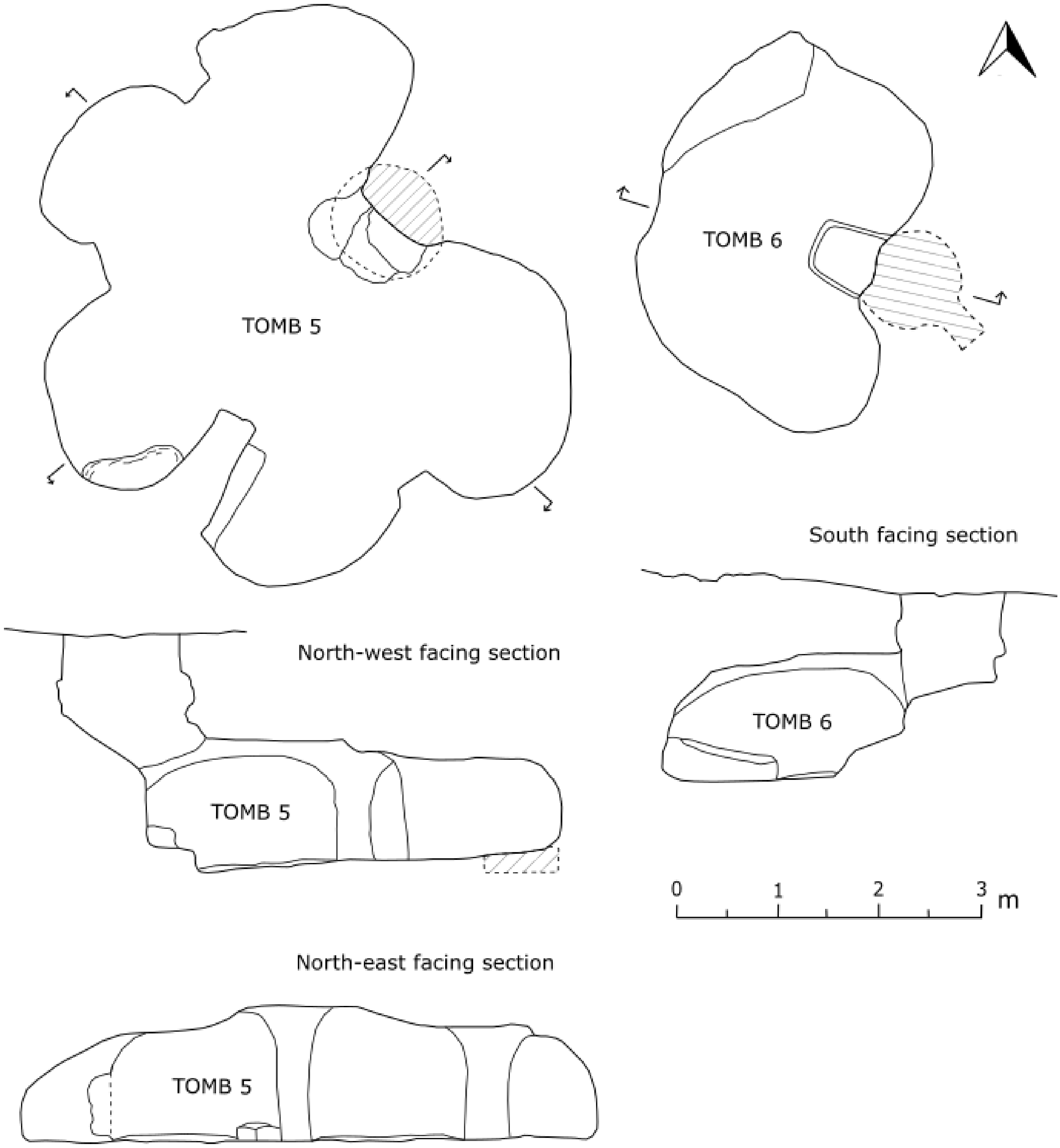

Figure 3: Plans and sections of Xemxija Tombs 5 and 6 (redrawn after Evans 1971).

2.2 Material culture

Image removed for copyright reasons. Copyright holder is John Evans.

Figure 4: Personal ornaments from Tomb 5. A – domical *Spondylus* shell buttons and pear-shaped *Spondylus* shell bead; b – flat shell pendants; c – axe pendants (from Evans 1971).

Image removed for copyright reasons. Copyright holder is John Evans.

Figure 5: Ceramics from Tombs 1, 2 and 5. 1 – carinated bowl (Tomb 1); 2 – deep cover (Tomb 2); 3 – large cylindrical basin (Tomb 5); 4 – carinated bowl. Scale 1:3. From Evans 1971.

Figure 6: Ceramics from Tombs 1, 2 5 and 6. 1 – carinated hole-mouth bowl (Tomb 5); 2 – flat-bottomed dish (Tomb 5); 3 – cover (Tomb 5); 4 – small jar (Tomb 1); 5 – carinated hole-mouth bowl on pedestal (Tomb 5); 6 – bowl (Tomb 5); 7 – rough bowl (Tomb 5); 8 – handled bowl (Tomb 5); 9 – dish (Tomb 6); 10 – polypod bowl (Tomb 2); 11 – bowl (Tomb 6); 12 – bowl (Tomb 1); 13 – irregular carinated bowl (Tomb 5); 14 – open bowl (Tomb 5). Scale 1: 3. From Evans 1971.

Image removed for copyright reasons. Copyright holder is John Evans.

Figure 7: Ceramics from Tombs 2, 3 5 and 6. 1 – carinated bowl (Tomb 6); 2 – spherical bowl (Tomb 6); 3 – handled bowl (Tomb 5); 4 – handled bowl; 5 – flat-bottomed bowl (Tomb 2); 6 – single-handled jug (Tomb 6); 7 – portion of an elongated basin (Tomb 2); 8 – cover (Tomb 6); 9 – fragment of the neck and shoulder of a large bowl (Tomb 3); 10 – open bowl (Tomb 5). Scale 1:3. From Evans 1971.

Figure 8: Ceramics from Tombs 3, 5 and 6. 1 – spherical bowl (Tomb 3); 2 – spherical bowl (Tomb 3); 3 – shallow cover (Tomb 3); 4 – spherical bowl (Tomb 3); 5 – shallow bowl (Tomb 6); 6 – shallow bowl with ring base (Tomb 3); 7 – carinated hole-mouth bowl (Tomb 5). Scale 1:3. From Evans 1971.

2.3 Inventory of the human remains (from Pike 1971a)

Element	Adult	Perinatal	<1 yo	1-5 yo	5-12 yo	12 yo-Adult
Cranium	1551	1	4		11	2
Zygoma					1	
Mastoid	37				1	
Petrous	67				1	
Mandible	147	7	1		11	
Maxilla	33	1			1	
Vertebra	1363	6	4	1	6	1
Rib	1719	14	11		18	
Sternum	22					
Scapula	88				2	1
Clavicle	97	5	2	3	5	
Ossa Coxae	4					
Acetabulum	38	1			5	2
Iliac crest	12	2				2
Pubic symphysis		1				
Pelvis (fragments)	63	2			15	2
Sacrum	27				7	3
Coccyx	2					
Humerus	173	21	4	4	14	1
Ulna	163	8	1	1	4	1
Radius	259	9	5	1	19	7
Ulna/Radius	40		1		2	
Femur	135	41	7	2	14	4
Patella	57	1			4	1
Tibia	177	13	2	1	17	4
Fibula	119				2	
Astragalus	99					
Calcaneum	91				5	
Carpals/Tarsals	285				1	
Metapodials	1390	1	3	1	7	15
Phalanges	1717				2	
Unidentifiable long bone shafts	1335				10	9

Table 6: Human bone fragments tabulated according to age from Pike 1971b.

2.4 Xemxija Tombs overall results

		Site No	Side	Anatomical Preservation Index	Qualitative Bone Index	Beetle Modification	Burning
N	Valid	14760	14760	14760	14760	37	46
	Missing	0	0	0	0	14723	14714
Minimum		2	0	1	0	0	0
Maximum		2	3	5	5	1	1

Table 7: Descriptive statistics for API, QBI and beetle modification.

		Angle	Outline	Texture	Excavation Damage	Abrasion	Weathering
N	Valid	2787	2789	2787	14307	14760	14760
	Missing	11973	11971	11973	453	0	0
Minimum		0	0	0	0	0	0
Maximum		2	3	3	1	5	5

Table 8: Descriptive statistics for fragmentation morphology (angle, outline, texture), excavation damage, abrasion/erosion, weathering and burning.

Side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unid	9215	62.4	62.4	62.4
	Left	2281	15.5	15.5	77.9
	Right	2337	15.8	15.8	93.7
	Axial	927	6.3	6.3	100.0
	Total	14760	100.0	100.0	

Table 9: Descriptive statistics for element side.

2.4.1 Completeness, preservation and fragment size

Anatomical Preservation Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-24%	10120	68.6	68.6	68.6
	25-49%	850	5.8	5.8	74.3
	50-74%	778	5.3	5.3	79.6
	75-99%	1351	9.2	9.2	88.7
	100%	1661	11.3	11.3	100.0
	Total	14760	100.0	100.0	

Table 10: Overall results for element completeness (API) in the Xemxija Tombs.

Qualitative Bone Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0%	2280	15.4	15.4	15.4
	1-24%	3788	25.7	25.7	41.1
	25-49%	3720	25.2	25.2	66.3
	50-74%	3593	24.3	24.3	90.7
	75-99%	1373	9.3	9.3	100.0
	100%	6	.0	.0	100.0
	Total	14760	100.0	100.0	

Table 11: Overall results for element preservation (QBI) in the Xemxija Tombs.

Fragment size

	N	Minimum	Maximum	Mean	Std. Deviation
Size	14525	1	29	3.87	2.365
Valid N (listwise)	14525				

Table 12: Overall results for fragment size in the Xemxija Tombs.

2.4.2 Fracture morphology and excavation damage

Angle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	3	.0	.1	.1
	Mixed	33	.2	1.2	1.3
	Dry	2751	18.6	98.7	100.0
	Total	2787	18.9	100.0	
Missing	System	11973	81.1		
Total		14760	100.0		

Table 13: Overall results for long bone fragmentation angle in the Xemxija Tombs.

Outline

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	4	.0	.1	.1
	Mixed	51	.3	1.8	2.0
	Dry	2733	18.5	98.0	100.0
	3	1	.0	.0	100.0
	Total	2789	18.9	100.0	
Missing	System	11971	81.1		
Total		14760	100.0		

Table 14: Overall results for long bone fragmentation outline in the Xemxija Tombs.

Texture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	1	.0	.0	.0
	Mixed	13	.1	.5	.5
	Dry	2771	18.8	99.4	99.9
	3	2	.0	.1	100.0
	Total	2787	18.9	100.0	
Missing	System	11973	81.1		
Total		14760	100.0		

Table 15: Overall results for long bone fragmentation texture in the Xemxija Tombs.

Excavation Damage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	13610	92.2	95.1	95.1
	Present	697	4.7	4.9	100.0
	Total	14307	96.9	100.0	
Missing	System	453	3.1		
Total		14760	100.0		

Table 16: Overall results for excavation damage in the Xemxija Tombs.

2.4.3 Weathering

Weathering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	13412	90.9	90.9	90.9
	Cracking	615	4.2	4.2	95.0
	Flaking	571	3.9	3.9	98.9
	Extensive flaking	138	.9	.9	99.8
	Fibrous texture	23	.2	.2	100.0
	Splintered	1	.0	.0	100.0
	Total	14760	100.0	100.0	

Table 17: Overall results for weathering in the Xemxija Tombs.

2.4.4 Abrasion and erosion

Abrasion/ erosion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	12499	84.7	84.7	84.7
	Slight	927	6.3	6.3	91.0
	Moderate	679	4.6	4.6	95.6
	Mostly abraded	429	2.9	2.9	98.5
	Completely abraded	210	1.4	1.4	99.9
	Heavy abrasion	16	.1	.1	100.0
	Total	14760	100.0	100.0	

Table 18: Overall results for abrasion and erosion in the Xemxija Tombs.

2.4.5 Burning

Burning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.0	2.7	2.7
	Present	36	.2	97.3	100.0
	Total	37	.3	100.0	
Missing	System	14723	99.7		
Total		14760	100.0		

Table 19: Overall results for burning in the Xemxija Tombs.

2.4.6 Animal damage

Beetle Modification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.0	2.2	2.2
	Present	45	.3	97.8	100.0
	Total	46	.3	100.0	
Missing	System	14714	99.7		
Total		14760	100.0		

Table 20: Overall results for beetle modification in the Xemxija Tombs.

Rodent Gnawing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present	14	.1	100.0	100.0
Missing	System	14746	99.9		
Total		14760	100.0		

Table 21: Overall results for rodent gnawing in the Xemxija Tombs.

2.4.7 Long bone preservation by zone

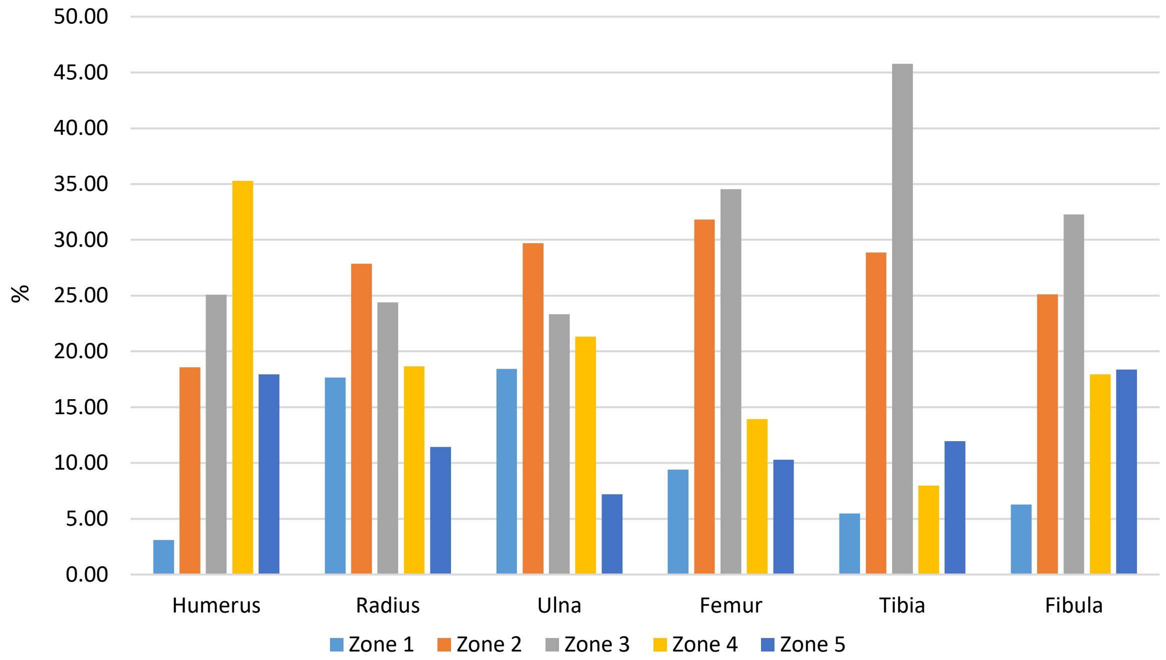

Figure 9: Long bone preservation according to zone for adult remains in the Xemxija tombs.

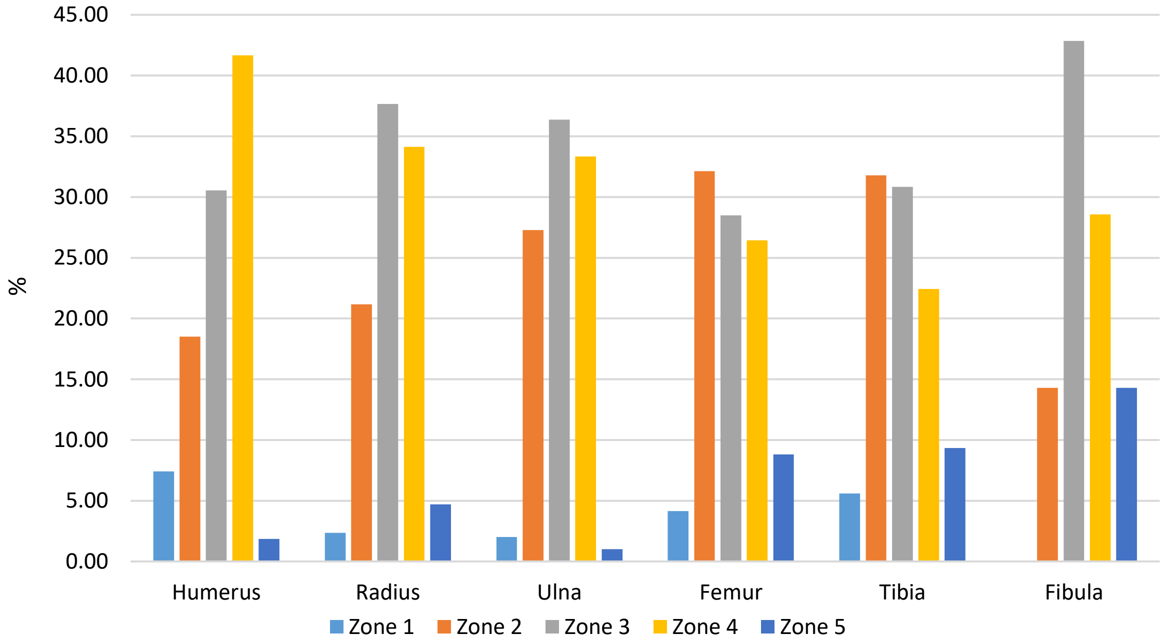

Figure 10: Long bone preservation according to zone for nonadult remains in the Xemxija tombs.

2.5 Completeness and preservation by bone type

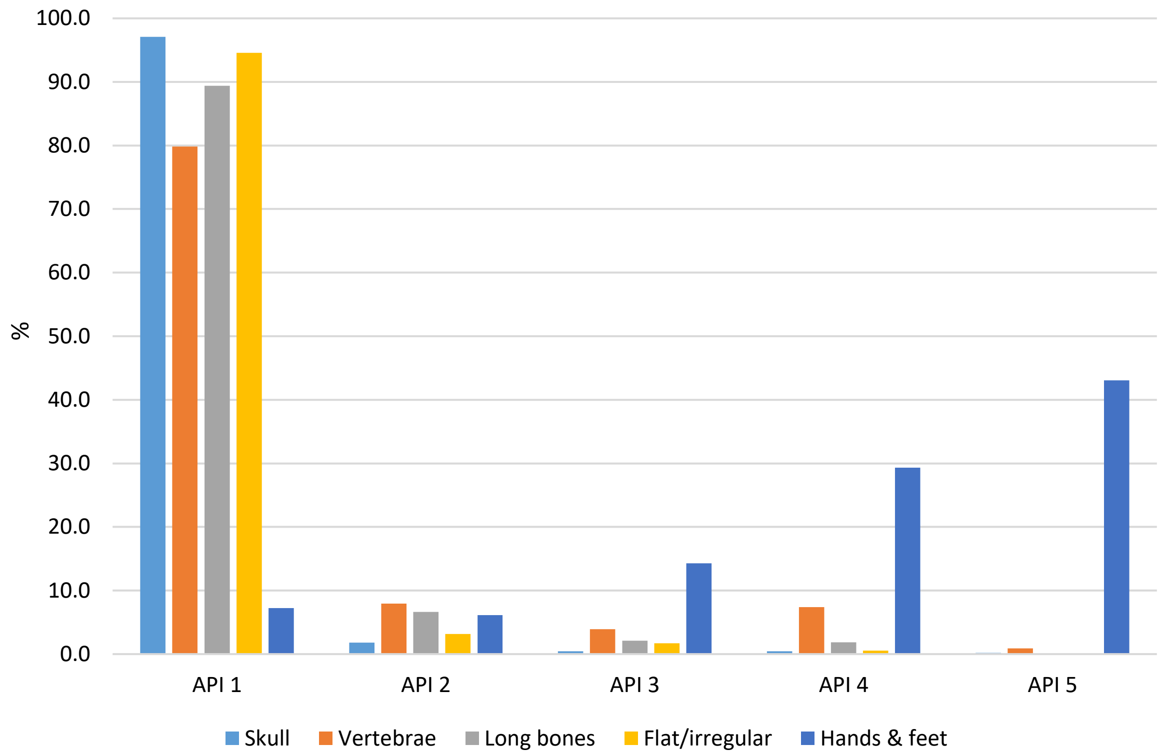

Figure 11: Element completeness (API) according to bone type in the Xemxija tombs.

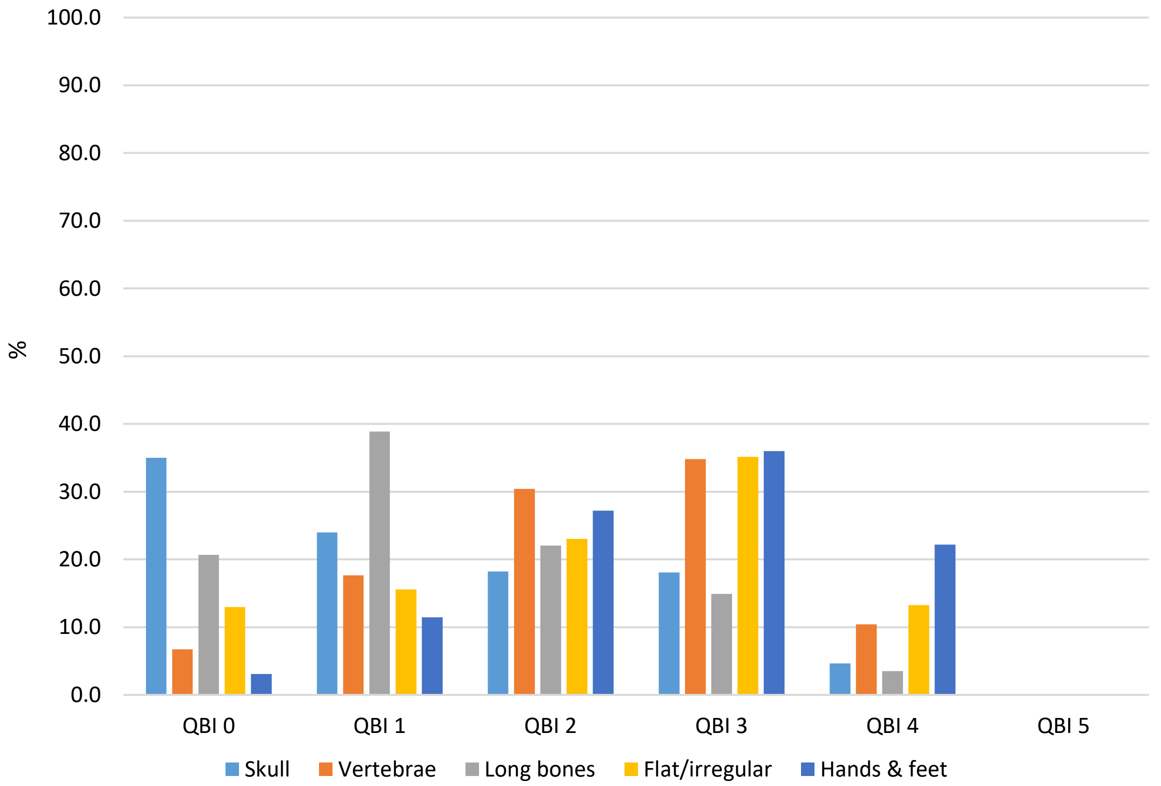

Figure 12: Element preservation (QBI) according to bone type in the Xemxija tombs.

2.6 MNE, MNI and BRI tables

Element	Left	Axial/unsided	Right	BRI adult	MNI adult
Cranium	-	16	-	20.00	16
Mandible	6	8	12	32.50	26
Clavicle	26	-	27	33.13	26
Hyoid	-	1	-	1.25	1
Cervicals	-	79	-	14.11	24
Thoracics	-	105	-	10.94	9
Lumbars	-	23	-	5.75	5
Ribs	132	-	172	15.83	14
Scapula	12	4	12	17.50	12
Manubrium	-	1	-	1.25	1
Sternum	-	8	-	10.00	7
Humerus	30		24	33.75	30
Radius	21	5	31	35.63	31
Ulna	23	13	35	44.38	35
Carpals	29	6	34	6.16	11
Metacarpals	241	93	236	71.25	60
Manual phalanges	-	741	-	33.08	48
Pelvis	5	-	3	5.00	5
Sacrum	-	5	-	6.25	3
Coccyx	-	4	-	5.00	4
Femur	13	8	12	20.63	12
Patella	23	-	31	33.75	31
Tibia	9	13	7	18.13	9
Fibula	17	1	21	24.38	22
Talus	42	-	39	50.63	43
Calcaneus	5	-	9	8.75	9
Tarsals	44	-	37	10.13	45
Metatarsals	315	87	328	91.25	80
Pedal phalanges	-	425	-	18.97	61

Table 22: MNE and BRI for all adult skeletal elements from the Xemxija Tombs.

Element	Left	Axial/unsided	Right	BRI nonadult	MNI nonadult
Cranium	-	9	-	28.13	9
Mandible	7	1	2	31.25	4
Clavicle	12	-	9	32.81	12
Hyoid	-	2	-	6.25	2
Cervicals	-	19	-	8.48	7
Thoracics	-	15	-	3.91	3
Lumbars	-	9	-	5.63	2
Ribs	20	2	16	4.95	3
Scapula	8	-	4	18.75	8
Manubrium	-	1	-	3.13	1
Sternum	-	2	-	6.25	2
Humerus	9	-	10	29.69	10
Radius	6	-	7	20.31	7
Ulna	9	-	5	21.88	9
Carpals	1	-	-	0.22	1
Metacarpals	8	8	6	6.88	3
Manual phalanges	-	23	-	2.68	3
Pelvis	5	-	10	23.44	10
Sacrum	-	3	-	9.38	3
Coccyx	-	0	-	0.00	-
Femur	20	7	16	67.19	20
Patella	3	1	1	7.81	3
Tibia	11	-	9	31.25	11
Fibula	-	2	1	4.69	1
Talus	2	-	0	3.13	1
Calcaneus	2	-	3	7.81	3
Tarsals	1	-	0	0.31	1
Metatarsals	23	28	13	20.00	11
Pedal phalanges	-	19	-	2.12	18

Table 23: MNE and BRI for all nonadult skeletal elements from the Xemxija Tombs.

Appendix 3: Xagħra Circle

3.1 Contexts with human remains

These data have been collated from the site monograph, '*Mortuary customs in prehistoric Malta. Excavations at the Brochtorff Circle at Xagħra (1987-1994)',* especially the Human Remains Catalogue in Appendix 9 (Malone, Stoddart, Trump, Bonanno, *et al.* 2009; Stoddart 2009). A more detailed consideration of stratigraphy and a full discussion of all inner cave zones can be found within.

3.1.1 Rock-cut tomb

Context	**NISP**	**% Analysed**	**MNI**	**FI**	**Features**
276	~7000	14.8%	41	196	Some primary burials, highly disturbed and disarticulated.
326, 334, 335	~3500	30%	24	177	Primary burials, disturbed but some articulations remain.
328	?	0%	?	?	

Table 24: Summary of contexts containing human bone in the rock-cut tomb.

3.1.2 North bone pit

Context	**NSP**	**% Analysed**	**MNI**	**FI**	**Features**
354	1565	14.8%	22–26	55	22 well-preserved crania. Possible older date than (799)— curation of bone.
623	21	0%	2	11	
622	620	0%	3	225	High in cranial fragments.
669	302	0%	4	59	Possible older date than (799) — curation of bone?
697	1915	0%	11–16	86	Mostly long bones and crania
799	4468	46.2%	15–26	126	10 crania, high numbers of upper limb bones and some foot bones (MNI from ulna, calcaneus and navicular). Articulated flexed inhumation of male individual.

Table 25: Summary of contexts containing human bone in the North bone pit.

3.1.2 Shrine

Context	NSP	% Analysed	MNI	FI	Features
805	28	0%	1	26	Mainly upper body elements.
790	45	0%	1–2	15	Disturbed skeleton of adult male placed against the screen.
740	1563	0%	8–19	61	Secondary deposit? Equal M:F, dominated by nonadults.
934	236	0%	4–10	22	60% MNI nonadult.
971	23	0%	2-3	5	Mostly infant and child *ossa coxae*.
947	743	0%	6–14	42	Residual deposit with some crania. 57% MNI nonadult.
1103	56	0%	2–5	9	
1105	117	0%	3–5	17	
842	873	0%	7–18	38	50% MNI nonadult, dominated by crania and femora.
767	12	0%	2	4	
776	715	0%	5	59	Secondary deposit?
514	53	0%	2	27	
518	2739	0%	15–31	74	68% MNI nonadult. Primary deposit (e.g. articulated torso), some secondary deposits- less residuals than long bones?
1024	146	100%	2–5	25	
831	2118	0%	17–25	63	55% MNI nonadult. Possibly primary deposit.
960	11,547	25.6%	42–71	126	Equal M:F and adult to nonadult. Mostly primary deposits, but significant rearrangement.
1206	6783	11.3%	29–63	95	Areas of nonadult and ‘female’ concentrations. Possibly primary deposit.
1216	145	0%	4-10	8	Adult male and infant buried in pit, amongst other remains.
1268	7823	3%	39–67	104	Three mostly intact inhumations and other fragmented bones.
1328	750	0%	6	66	Stacked burials A, B, C, D.

Table 26: Summary of contexts containing human bone in the Shrine.

3.1.3 Deep zone

Context	NSP	% Analysed	MNI	FI	Features
1155	186	0%	5–7	25	Dominated by nonadult remains.
938	167	0%	1	54	
933	1166	0%	8–11	54	Dominated by crania, and higher frequency of females than males.
951	12,796	15.3%	78	125	Secondary, disarticulated deposit. Some crania moved here from another location.
1204	241	0%	4–9		55% MNI nonadult. High number of long bones.
1200	1454	0%	10–18	62	Equal M:F and adult to nonadult ratio. High numbers of long bones and crania. Possible secondary deposit.
1111	1131	0%	11–17	59	53% MNI nonadult, high number of long bones. Possible secondary deposit.
1144	1619	9.3%	18–29	51	55% MNI nonadult. Residual deposit, high number of crania.
1222	221	0%	2–7	24	57% MNI nonadult.
1225	205	0%	3–8	21	50% MNI nonadult. Residual deposit.
1231	38	0%	2-6	6	Pit. 83% MNI nonadult.
1237	754	0%	6–13	45	62% MNI nonadult, possible primary deposit.
1307	465	0%	6–12	38	75% MNI nonadult, high in crania and arm bones. Possible secondary deposit.
1220	791	0%	9–17	41	Pit. Disarticulated, equal M:F and adult to nonadult ratio.
1234	277	0%	4–11	21	Possible primary deposit.
1257	38	0%	4	125	Mostly young individuals, tibiae and finger bones.

Table 27: Summary of contexts containing human bone in the Deep zone.

3.1.4 North Niche

Contex t	NSP	MNI	FI	Features
845	11,88 2	56–86	115	Possible primary deposition with later disturbance. High number of nonadults. Long bones and crania prevalent.
863	1269	15–58	41	High in residual bone and nonadult individuals.
819	3	1	1	
823	5	1	3	
802	26	1	18	
748	11	1	5	
821	25	1	25	
763	84	5	15	

Table 28: Summary of contexts containing human bone in the North niche.

3.1.5 Display zone

Context	NSP	% Analysed	MNI	FI	Features
783	53,139	9.3%	160–272	161	43% MNI nonadult, highly disarticulated. Most depositions primary, with large number of residual bones. Secondary practices resulted in removal of many larger bones. There is mention of 'scorching' to some bones on the recording sheets.
1088	234	0%	3–7	24	Possible primary deposition.
997	2926	0%	13–29	81	52% MNI nonadult; Likely primary deposition due to high numbers of residual bones.
966	280	0%	4–8	30	
942	1176	0%	7–15	47	Some evidence of burning.
982	72	0%	1	39	
943	29	0%	2–3	4	
931	624	0%	5–8	48	Secondary deposit, lack of hand and feet bones.
929	50	0%	1	38	
760	4756	0%	43		High numbers of adults and residual bones.
731/751	1484	0%	23	48	High number of nonadults.
736	?	0%			High numbers of nonadults and residual bones.

Table 29: Summary of contexts containing human bone in the Display zone and West niche.

3.1.6 East Cave

Context	NSP	MNI	FI	Features
1241	9053	47–91	91	Primary deposition of 5 nearly complete individuals in the lower level. Increased disturbance of remains in upper levels.
1281	199	5–10	19	Dominated by residual bones.
1240	6	1	6	
1151	31	1–2	8	
1012	118	3–6	16	66% MNI nonadult.
1114	4	1	4	
1153	32	2–3	8	
1067	379	4–6	60	Pit containing flexed child and remains of other individuals, mostly nonadult.
1025	12	1	12	
908	89	2–4	14	Cranial and residual fragments dominate, high number of nonadult remains.
913	98	2–3	15	Dominated by nonadults.
906	11	1–2	5	

865	24	2–3	6	
839	4	1	4	
926	523	6–8	50	
852	582	2–5	66	Crania and long bones dominate, many nonadults.
1150	11	1–2	5	
1152	21	1–2	21	
1148	206	5–11	15	72% MNI pre-adult.
1147	34	3–5	6	
1137	93	3–10	8	Nonadults dominate.
1011	74	2–6	12	Mainly residual elements.
1059	4	1–2	2	
1058	9	1–2	5	
1027	1	1	1	
1023	61	3–6	10	
1311	81	2–6	13	Nonadults dominate.
1304	237	4–8	22	Nonadults dominate.
1302	44	2–3	13	
1300	271	4–9	22	55% MNI nonadult. High numbers of crania and residual elements.
1276	26	2–5	4	
709	293	3–5	44	
594	26	1	7	
595	3333	29	100	High in nonadults and residual elements. Possible primary deposition.
656	241	4–7	21	
840	42	2–3	5	
734	82	2–3	12	
131	?	1		Nonadult inhumation.

Table 30: Summary of contexts containing human bone in the East Cave.

3.1.7 Southwest niche

Context	NSP	% Analysed	MNI	FI	Features
709	293	0	5	44	
595	3333	72%	29	100	Residual, high in nonadult remains. Associated with animal bone.
656	241	100%	7	21	Long bone curation.
840	42	0	3	5	
734	82	65%	3	12	Cranial curation.

Table 31: Summary of contexts containing human bone in the Southwest niche.

3.1.8 Central pit

Context	NSP	% Analysed	MNI	FI	Features
433	32	0%	2	12	
436	383	61.4%	4	60	Subadult inhumation and remains of another individual. Hand bones but no feet bones- separated during slumping?
737	17	0%	1	8	Mostly postcranial fragments.
741	197	0%	4–5	-	Subadult inhumation, with fragments of another younger individual and a high number of clavicles and scapulae.
743	145	82.8%	1–2	69	Upper torso and limbs of subadult inhumation, skull missing. Fragments of hand bone from another individual.

Table 32: Summary of contexts containing human bone in the Central pit.

3.2 Xagħra Circle overall results

		Site No	Side	Anatomical Preservation Index	Qualitative Bone Index	Beetle Modification
N	Valid	19056	19056	19056	19056	5
	Missing	0	0	0	0	19051
Minimum		1	0	0	0	1
Maximum		1	3	5	5	1

Table 33: Descriptive statistics for API, QBI and beetle modification.

		Angle	Outline	Texture	Excavation Damage	Abrasion	Weathering	Burning
N	Valid	1702	1702	1702	19056	19056	19056	24
	Missing	17354	17354	17354	0	0	0	19032
Minimum		0	0	0	0	0	0	1
Maximum		2	2	2	1	5	5	1

Table 34: Descriptive statistics for fragmentation morphology, excavation damage, abrasion/erosion, weathering and burning.

Side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unid	11801	61.9	61.9	61.9
	Left	2874	15.1	15.1	77.0
	Right	2913	15.3	15.3	92.3
	Axial	1468	7.7	7.7	100.0
	Total	19056	100.0	100.0	

Table 35: Descriptive statistics for element side.

3.2.1 Completeness, preservation and fragment size

Anatomical Preservation Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0%	14	.1	.1	.1
	1-24%	13281	69.7	69.7	69.8
	25-49%	1544	8.1	8.1	77.9
	50-74%	662	3.5	3.5	81.3
	75-99%	2031	10.7	10.7	92.0
	100%	1524	8.0	8.0	100.0
	Total	19056	100.0	100.0	

Table 36: Descriptive statistics for element completeness (API) at the Xagħra Circle.

Qualitative Bone Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0%	4249	22.3	22.3	22.3
	1-24%	1508	7.9	7.9	30.2
	25-49%	2247	11.8	11.8	42.0
	50-74%	3998	21.0	21.0	63.0
	75-99%	6271	32.9	32.9	95.9
	100%	783	4.1	4.1	100.0
	Total	19056	100.0	100.0	

Table 37: Descriptive statistics for element preservation (QBI) at the Xagħra Circle.

Fragment size

	N	Minimum	Maximum	Mean	Std. Deviation
Size	18317	1	39	2.97	2.638
Missing	739				
Valid N (listwise)	18317				

Table 38: Descriptive statistics for fragment size at the Xagħra Circle.

3.2.2 Fracture morphology

Angle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	3	.0	.2	.2
	Mixed	14	.1	.8	1.0
	Dry	1685	8.8	99.0	100.0
	Total	1702	8.9	100.0	
Missing	System	17354	91.1		
Total		19056	100.0		

Table 39: Descriptive statistics for fragmentation angle at the Xagħra Circle.

Outline

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	3	.0	.2	.2
	Mixed	11	.1	.6	.8
	Dry	1688	8.9	99.2	100.0
	Total	1702	8.9	100.0	
Missing	System	17354	91.1		
Total		19056	100.0		

Table 40: Descriptive statistics for fragmentation outline at the Xagħra Circle.

Texture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	2	.0	.1	.1
	Mixed	6	.0	.4	.5
	Dry	1694	8.9	99.5	100.0
	Total	1702	8.9	100.0	
Missing	System	17354	91.1		
Total		19056	100.0		

Table 41: Descriptive statistics for fragmentation texture at the Xagħra Circle.

Excavation Damage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	18170	95.4	95.4	95.4
	Present	886	4.6	4.6	100.0
	Total	19056	100.0	100.0	

Table 42: Descriptive statistics for excavation damage at the Xagħra Circle.

3.2.3 Weathering

Weathering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	18010	94.5	94.5	94.5
	Cracking	388	2.0	2.0	96.5
	Flaking	491	2.6	2.6	99.1
	Extensive flaking	103	.5	.5	99.7
	Fibrous texture	27	.1	.1	99.8
	Splintered	37	.2	.2	100.0
	Total	19056	100.0	100.0	

Table 43: Descriptive statistics for weathering at the Xagħra Circle.

3.2.4 Abrasion and erosion

Abrasion/ erosion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	16837	88.4	88.4	88.4
	Slight	1891	9.9	9.9	98.3
	Moderate	244	1.3	1.3	99.6
	Mostly abraded	55	.3	.3	99.8
	Completely abraded	21	.1	.1	100.0
	Heavy abrasion	8	.0	.0	100.0
	Total	19056	100.0	100.0	

Table 44: Descriptive statistics for abrasion and erosion at the Xagħra Circle.

3.2.5 Burning

Burning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present	24	.1	100.0	100.0
Missing	System	19032	99.9		
Total		19056	100.0		

Table 45: Descriptive statistics for burning at the Xagħra Circle.

3.2.6 Animal damage

Beetle Modification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present	5	.0	100.0	100.0
Missing	System	19051	100.0		
Total		19056	100.0		

Table 46: Descriptive statistics for beetle modification at the Xagħra Circle.

3.3 Completeness and preservation by bone type

3.3.1 Rock-cut tomb

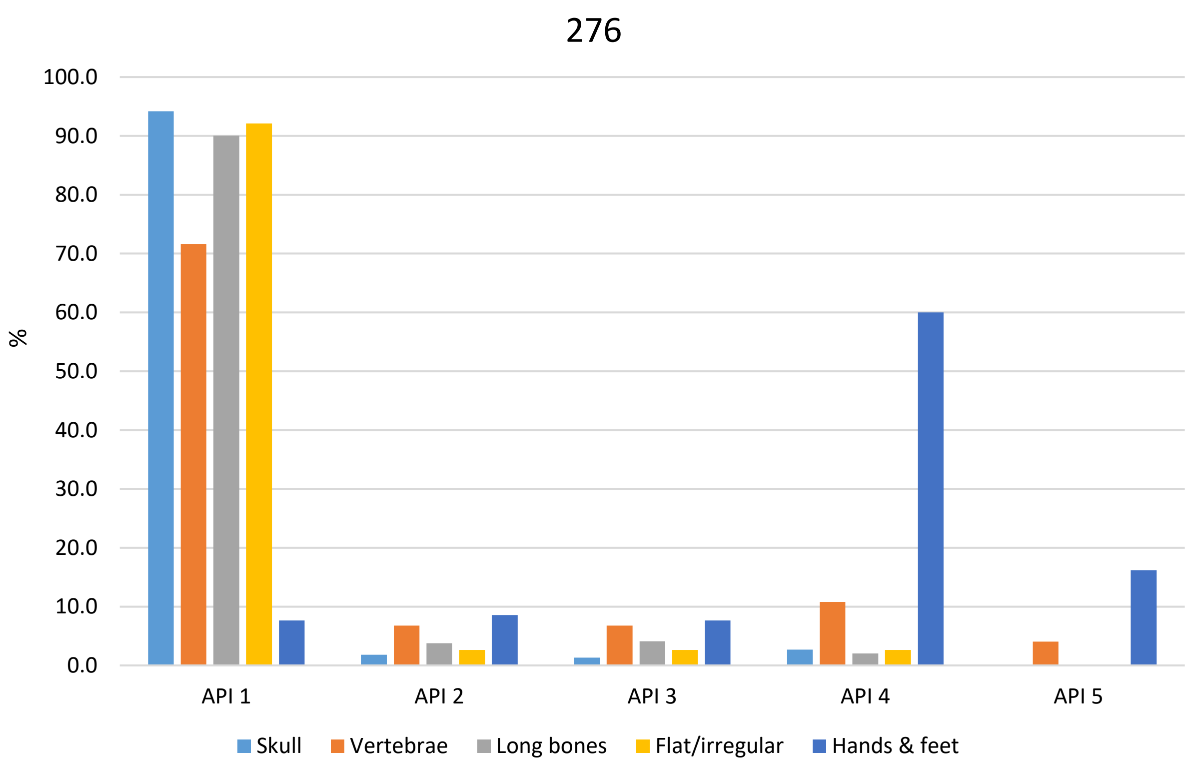

Figure 13: Element completeness (API) according to bone type in (276), the West chamber of the rock-cut tomb.

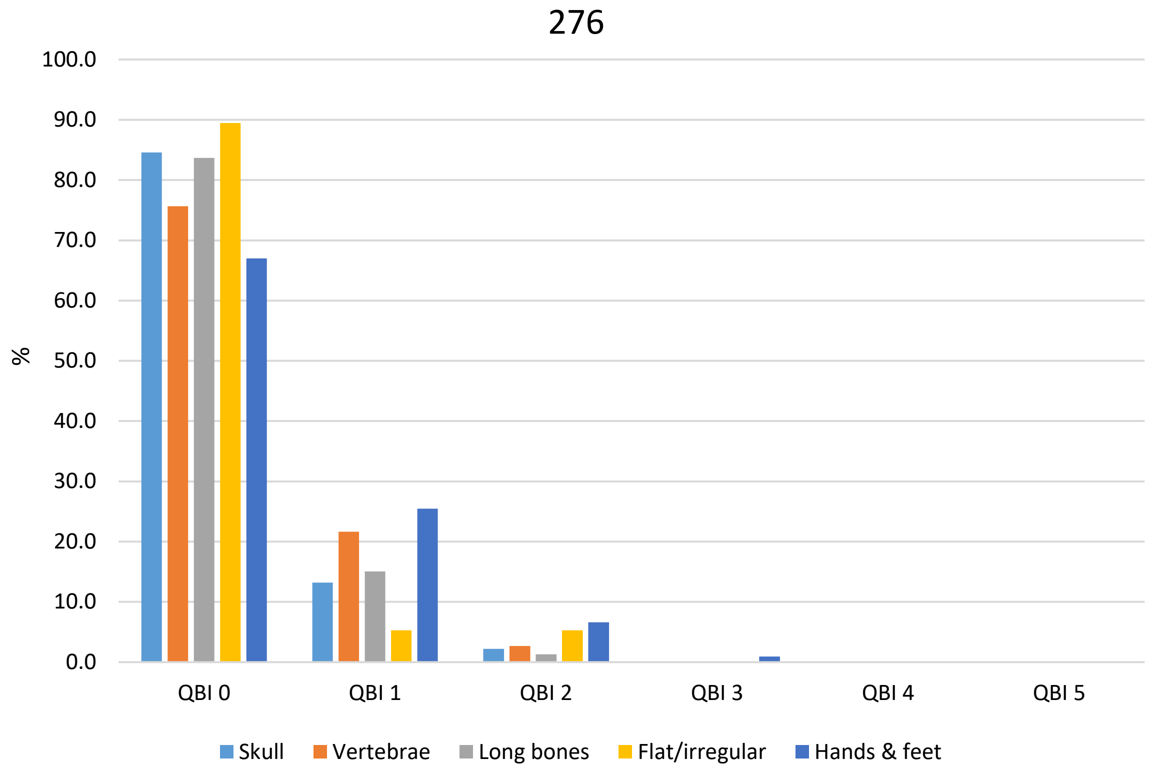

Figure 14: Element preservation (QBI) according to bone type in (276), the West chamber of the rock-cut tomb.

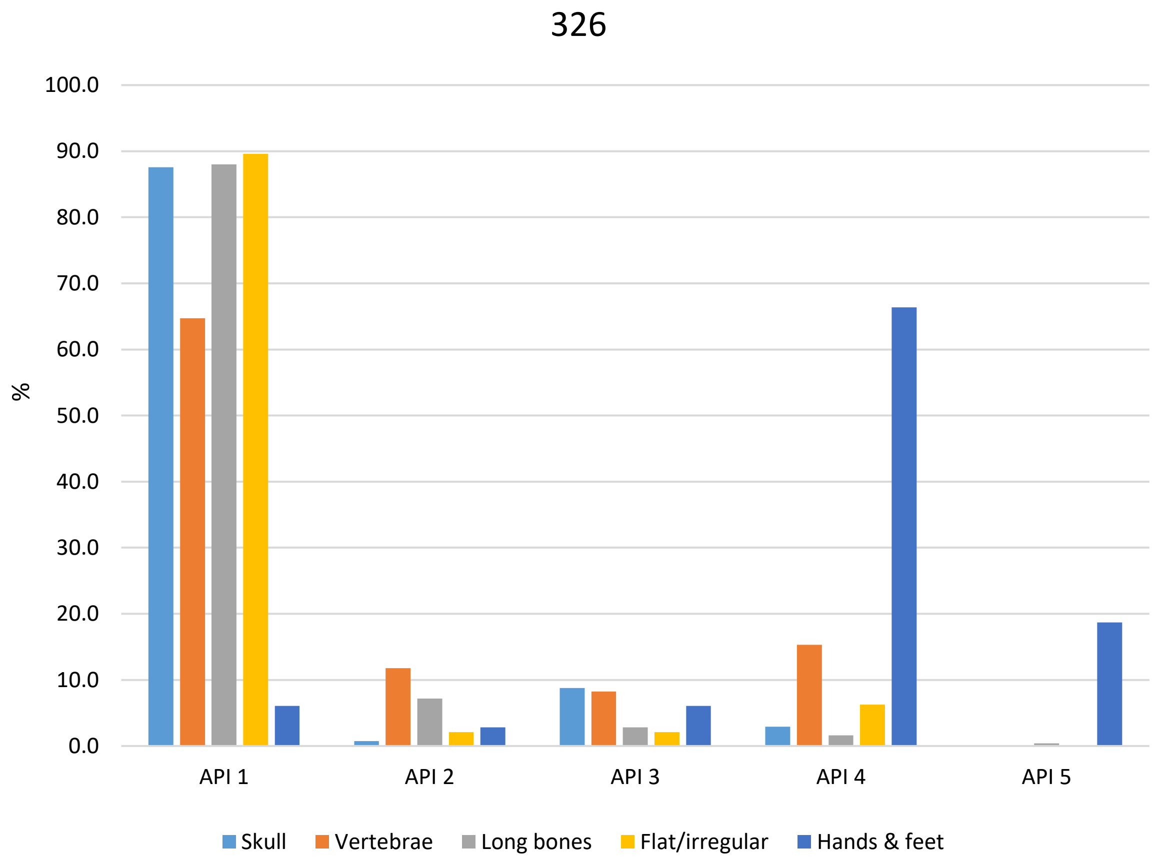

Figure 15: Element completeness (API) according to bone type in (326), the East chamber of the rock-cut tomb.

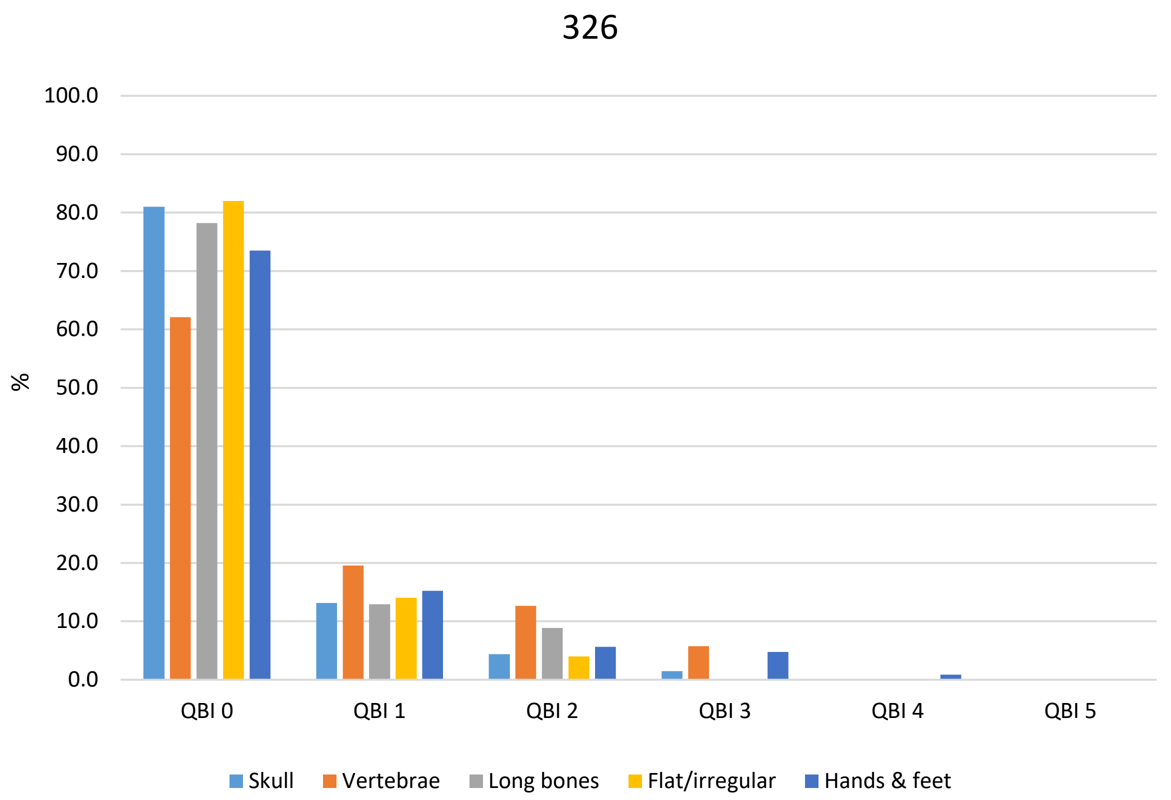

Figure 16: Element preservation (QBI) according to bone type in (326), the East chamber of the rock-cut tomb.

3.3.2 North bone pit

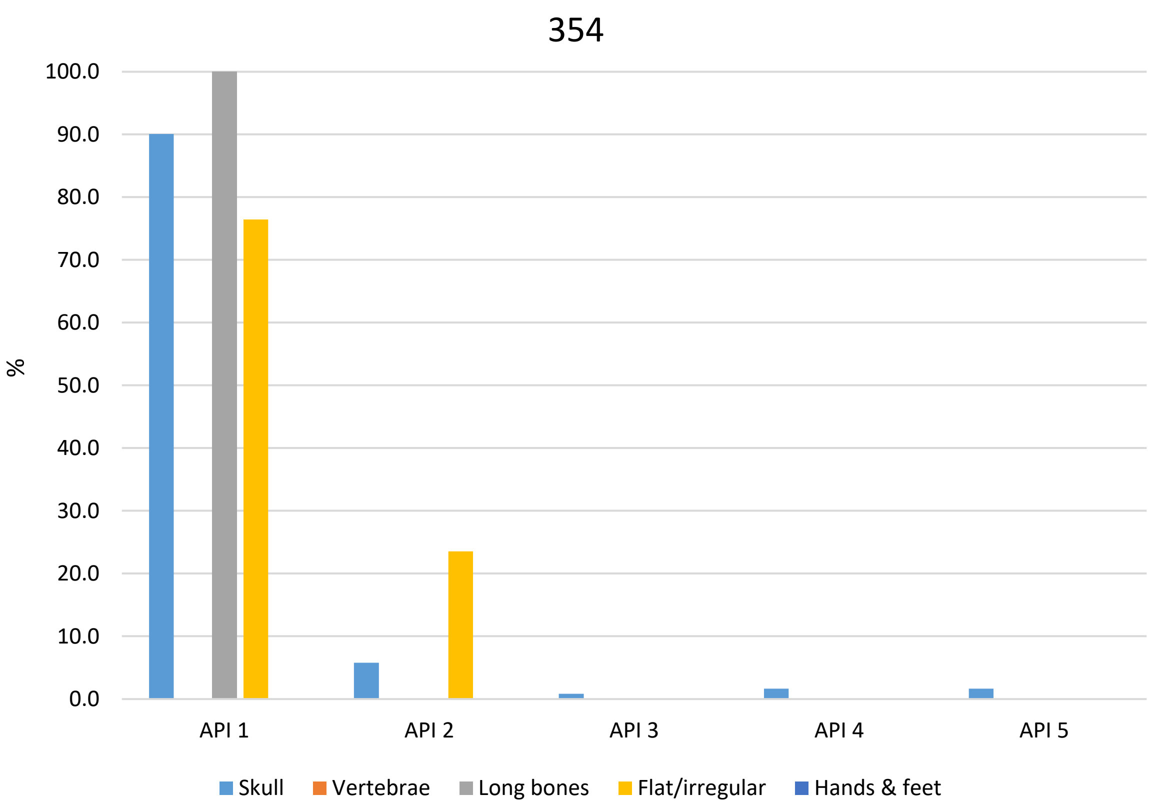

Figure 17: Element completeness (API) according to bone type in (354), in the North bone pit.

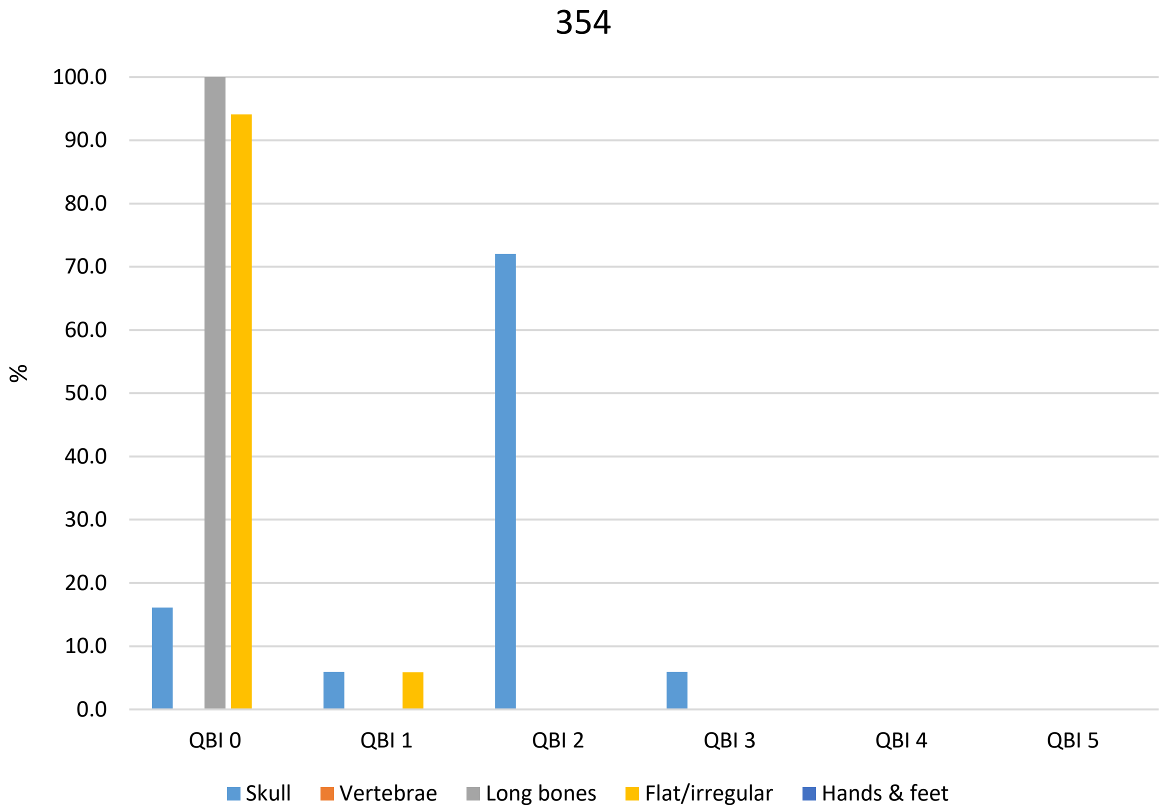

Figure 18: Element preservation (QBI) according to bone type in (354), in the North bone pit.

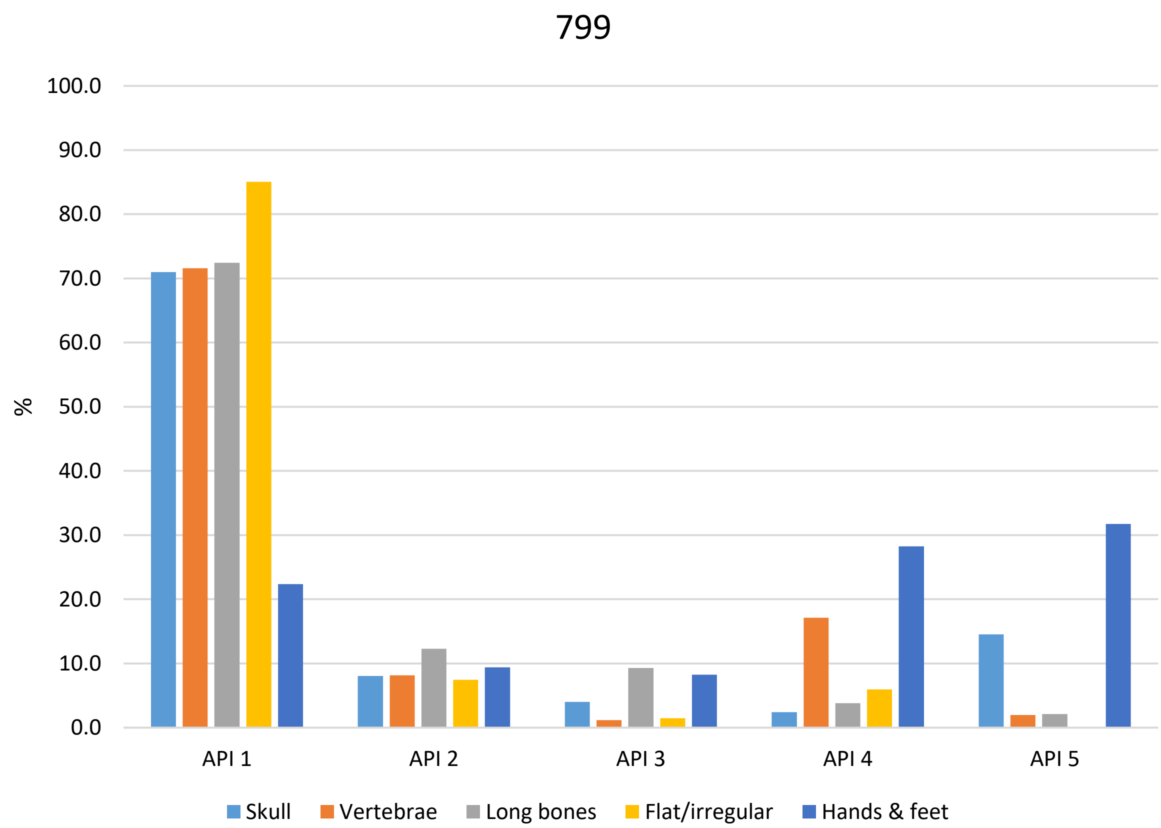

Figure 19: Element completeness (API) according to bone type in (799), in the North bone pit.

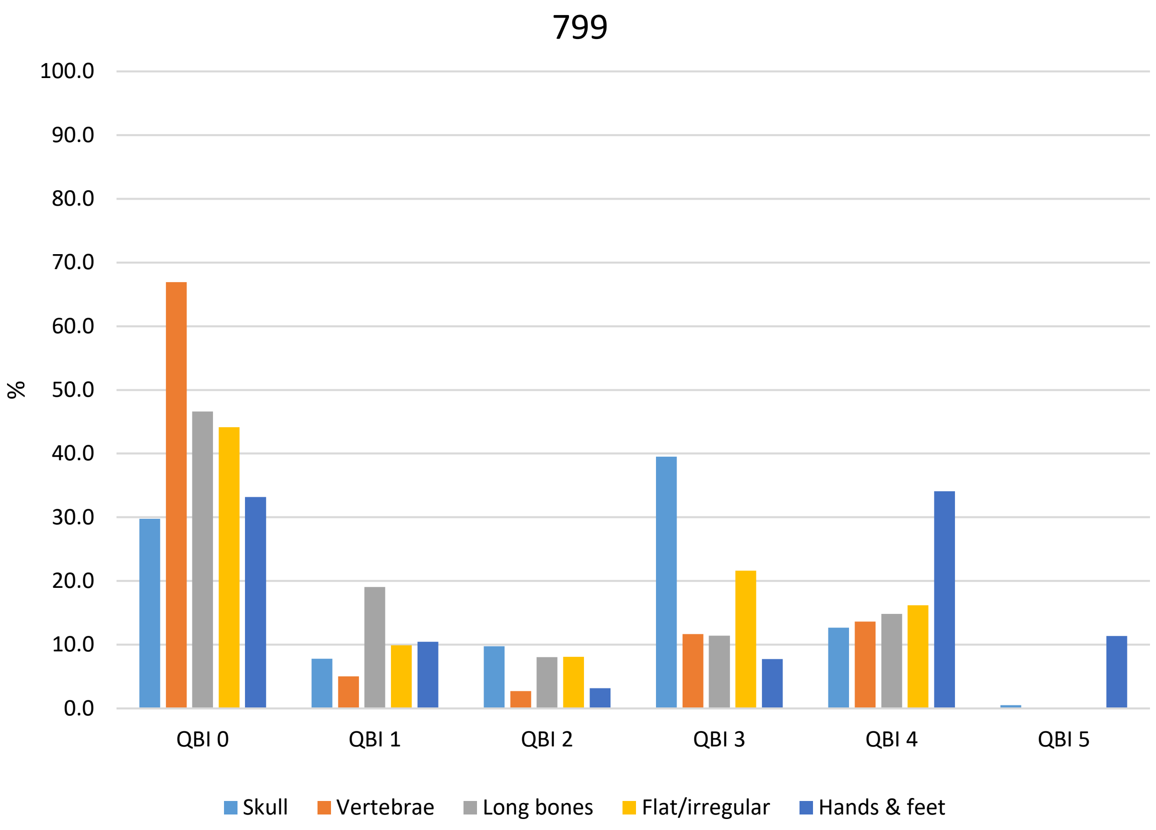

Figure 20: Element preservation (QBI) according to bone type in (799), in the North bone pit.

3.3.3 Deep zone

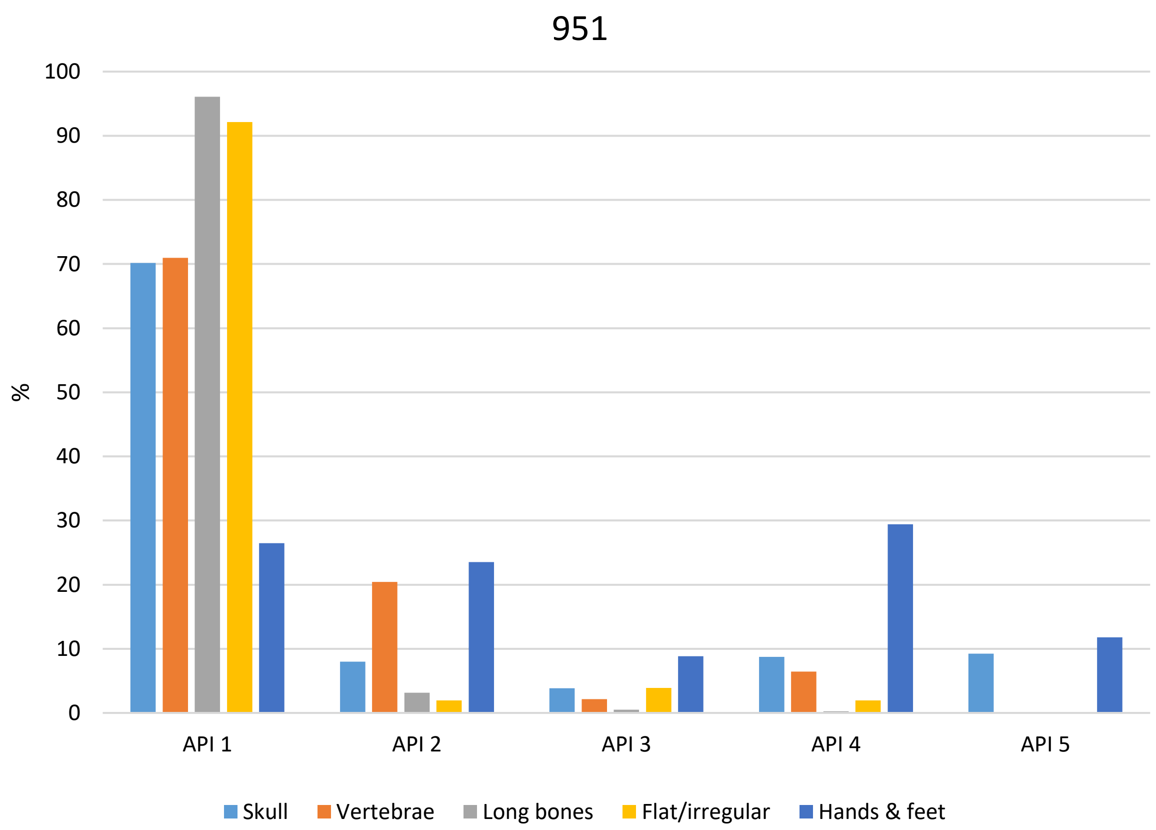

Figure 21: Element completeness (API) according to bone type in (951), in the Deep zone.

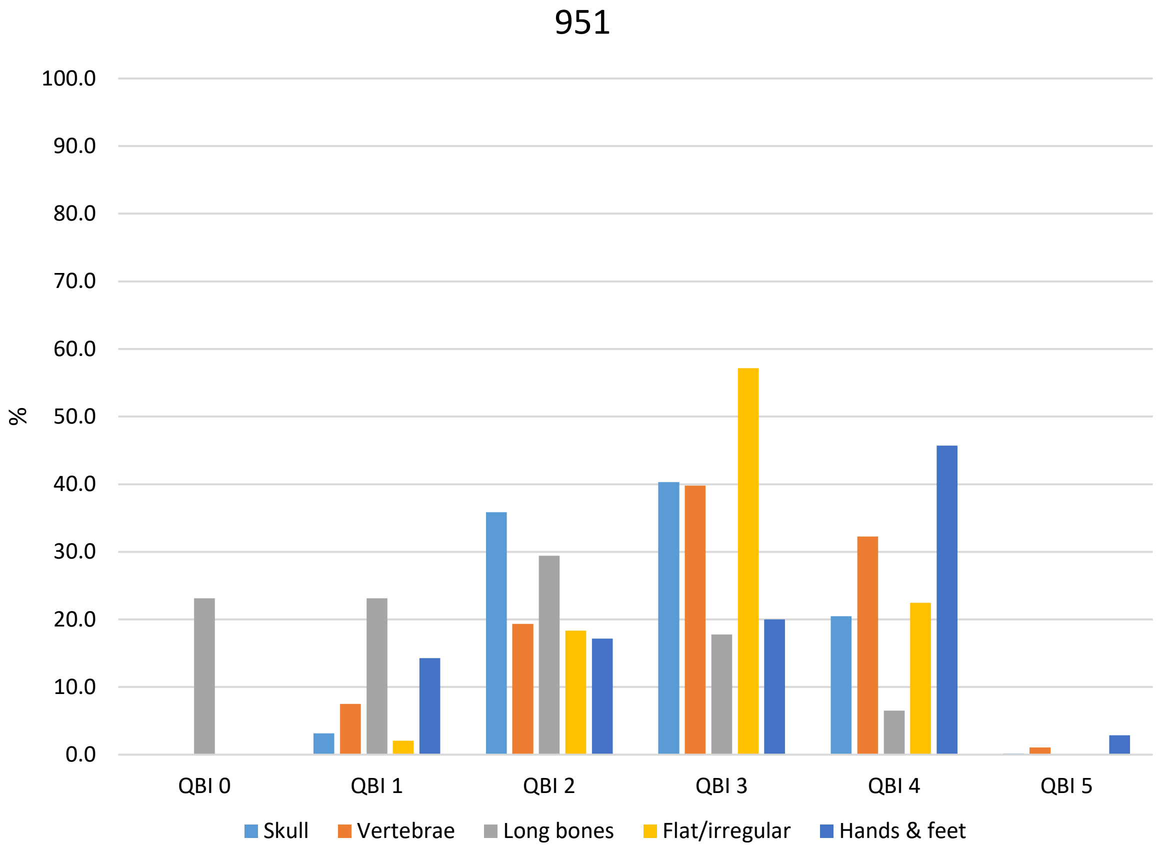

Figure 22: Element preservation (QBI) according to bone type in (951), in the Deep zone.

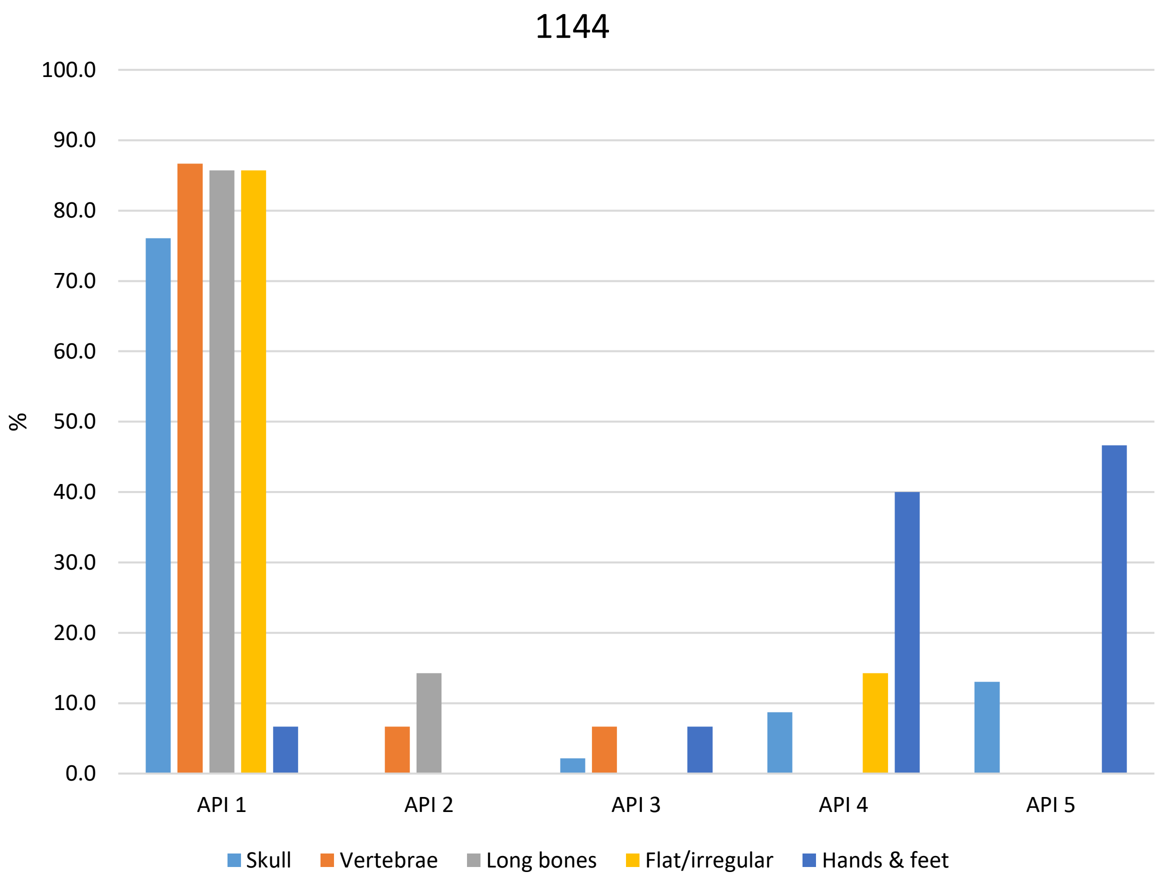

Figure 23: Element completeness (API) according to bone type in (1144), in the Deep zone.

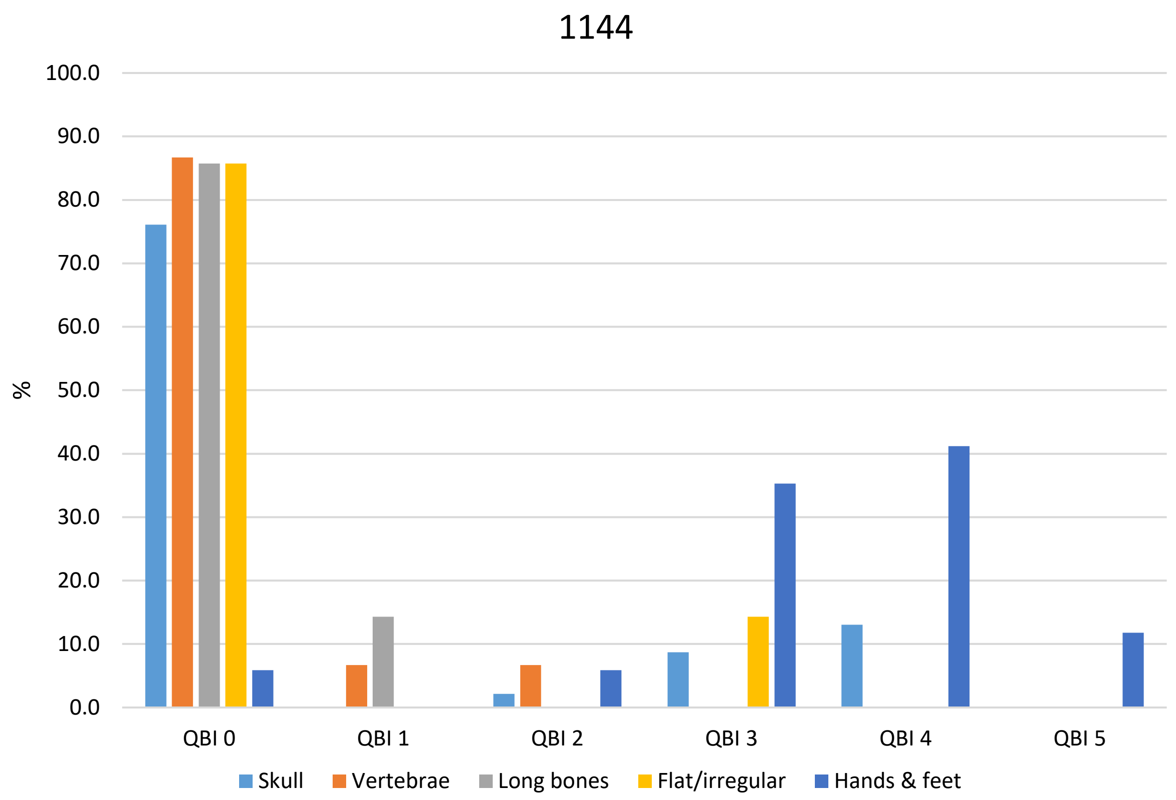

Figure 24: Element preservation (QBI) according to bone type in (1144), in the Deep zone.

3.3.4 Display zone

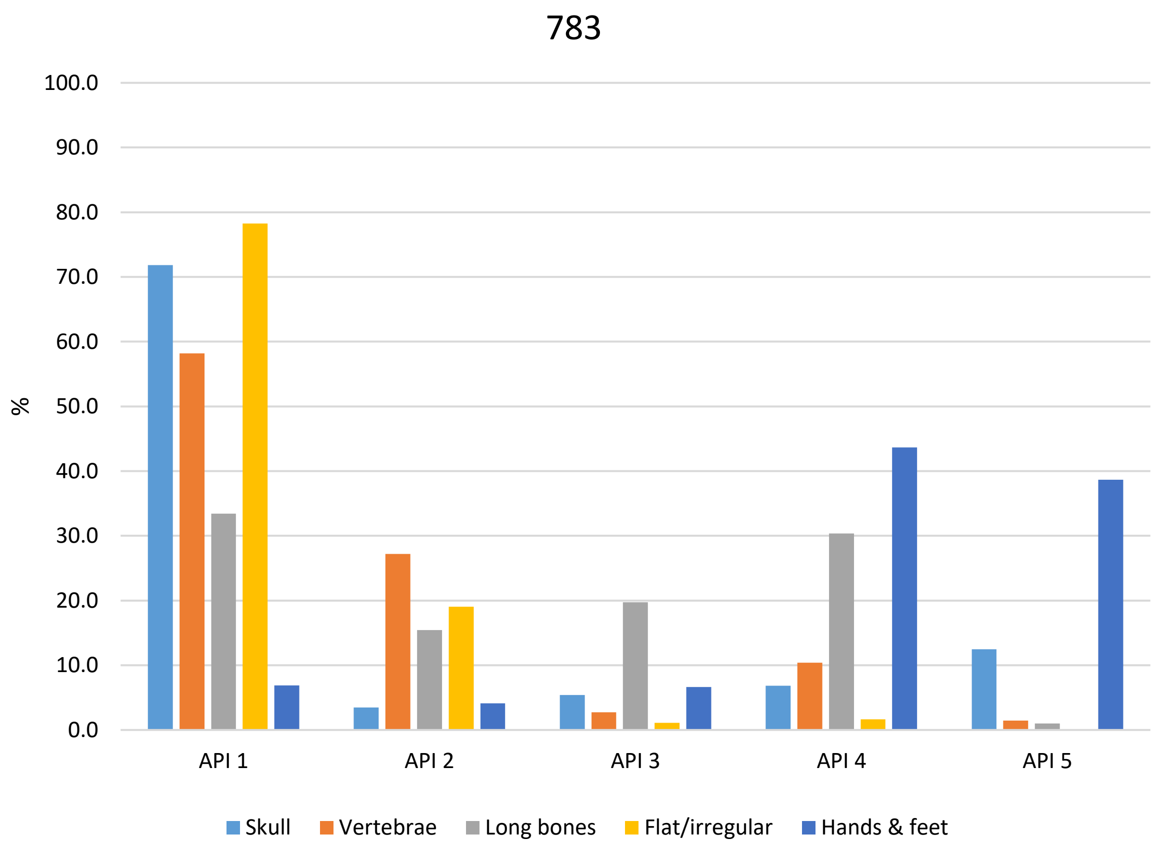

Figure 25: Element completeness (API) according to bone type in (783), in the Display zone.

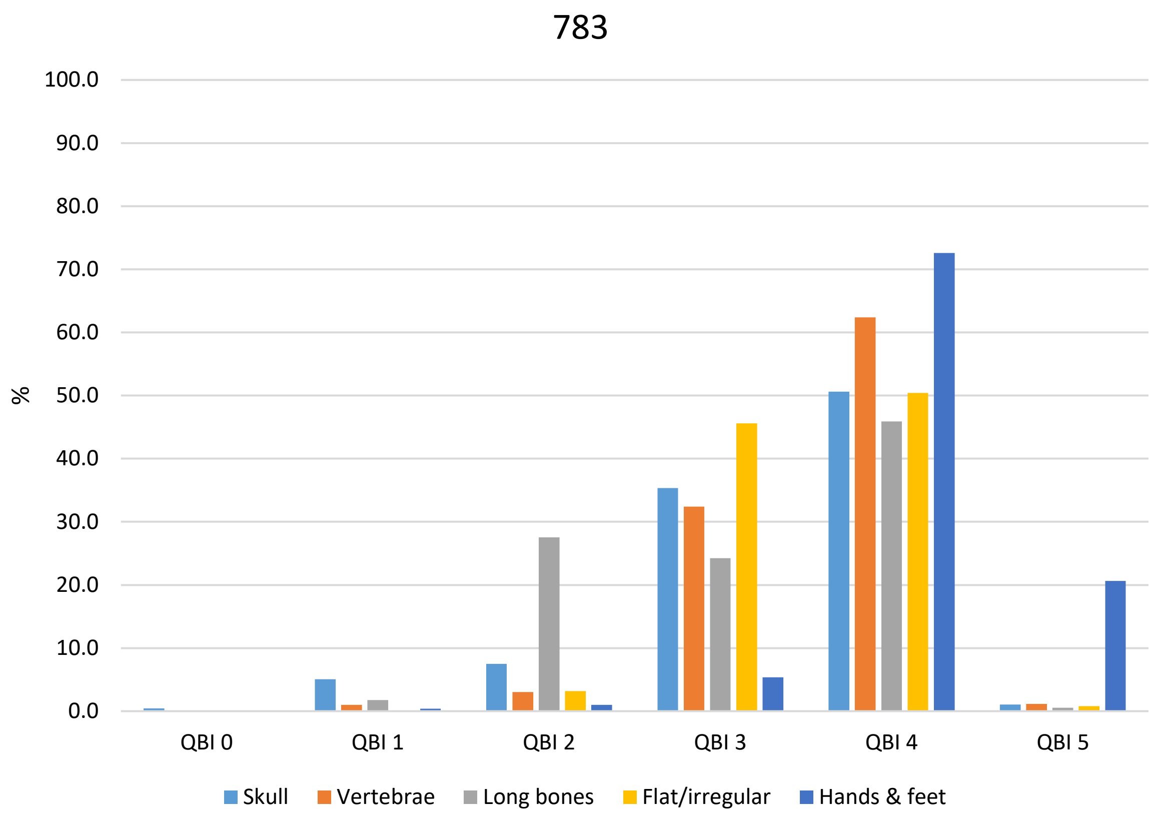

Figure 26: Element preservation (QBI) according to bone type in (783), in the Display zone.

3.3.5 Shrine sequence

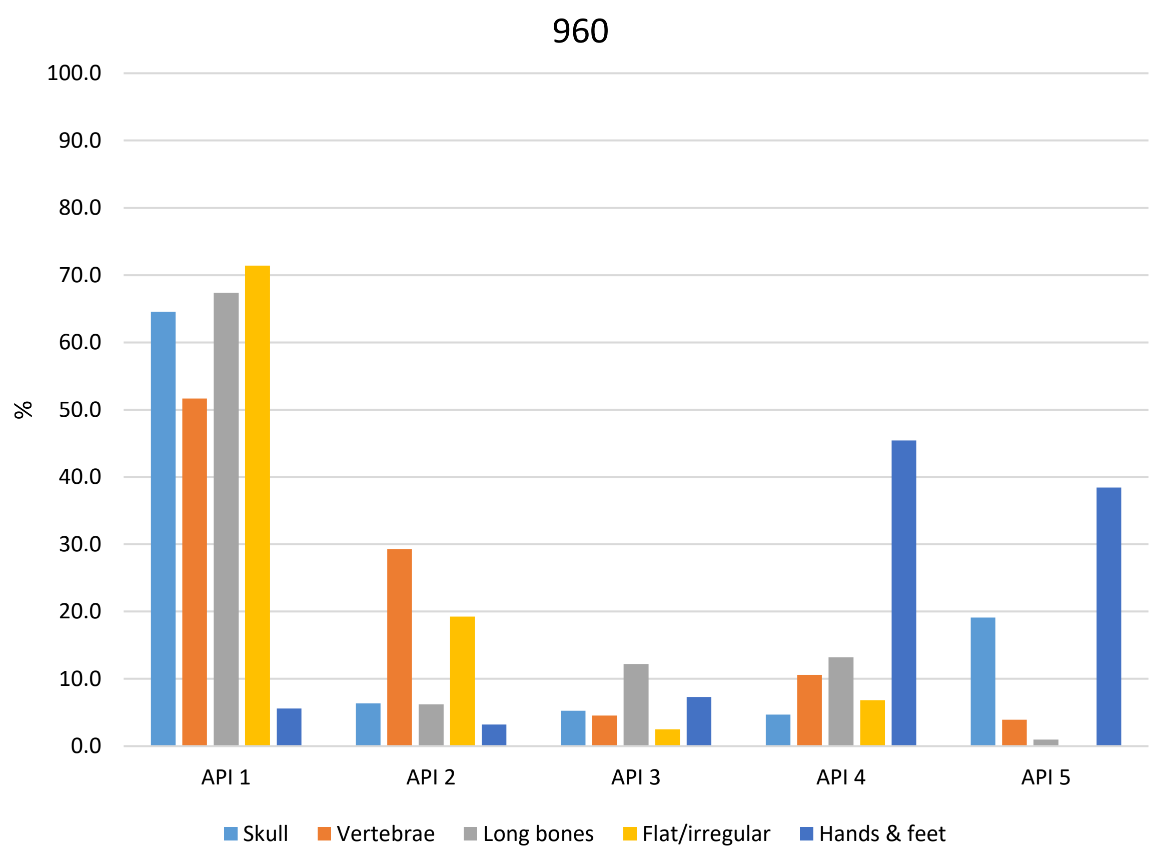

Figure 27: Element completeness (API) according to bone type in (960), in the Shrine.

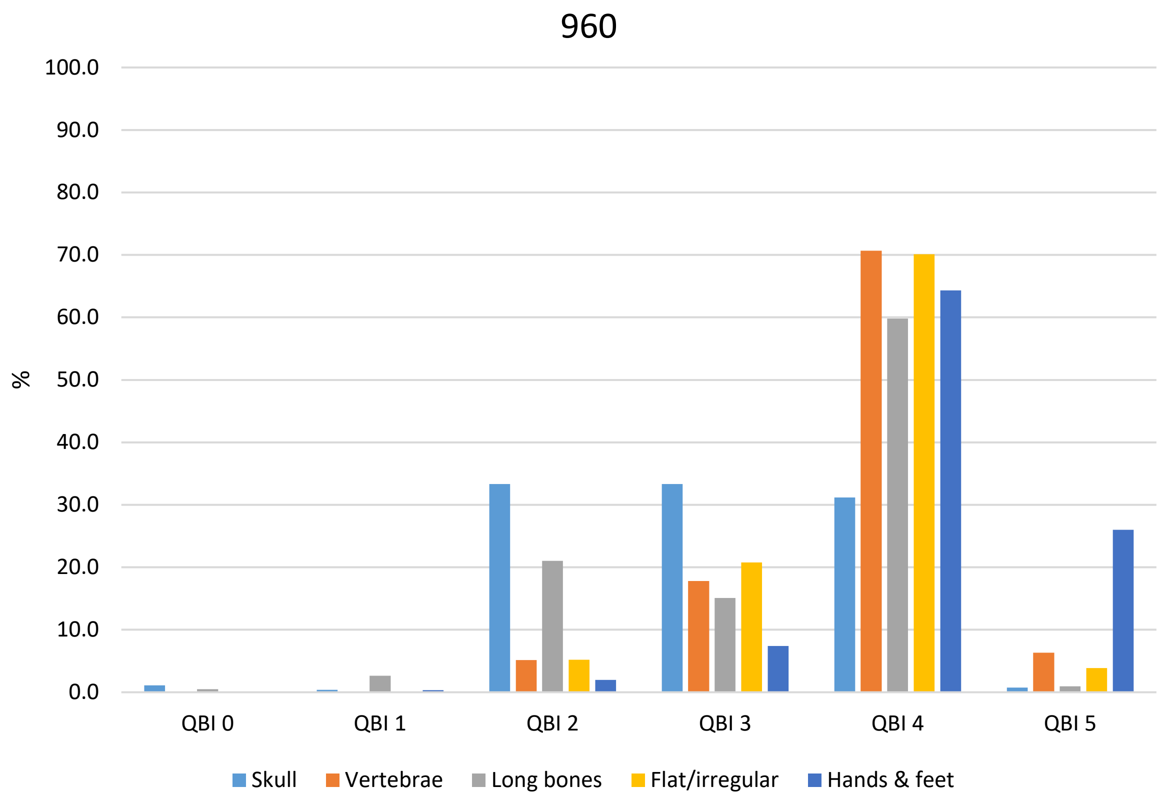

Figure 28: Element preservation (QBI) according to bone type in (783), in the Shrine.

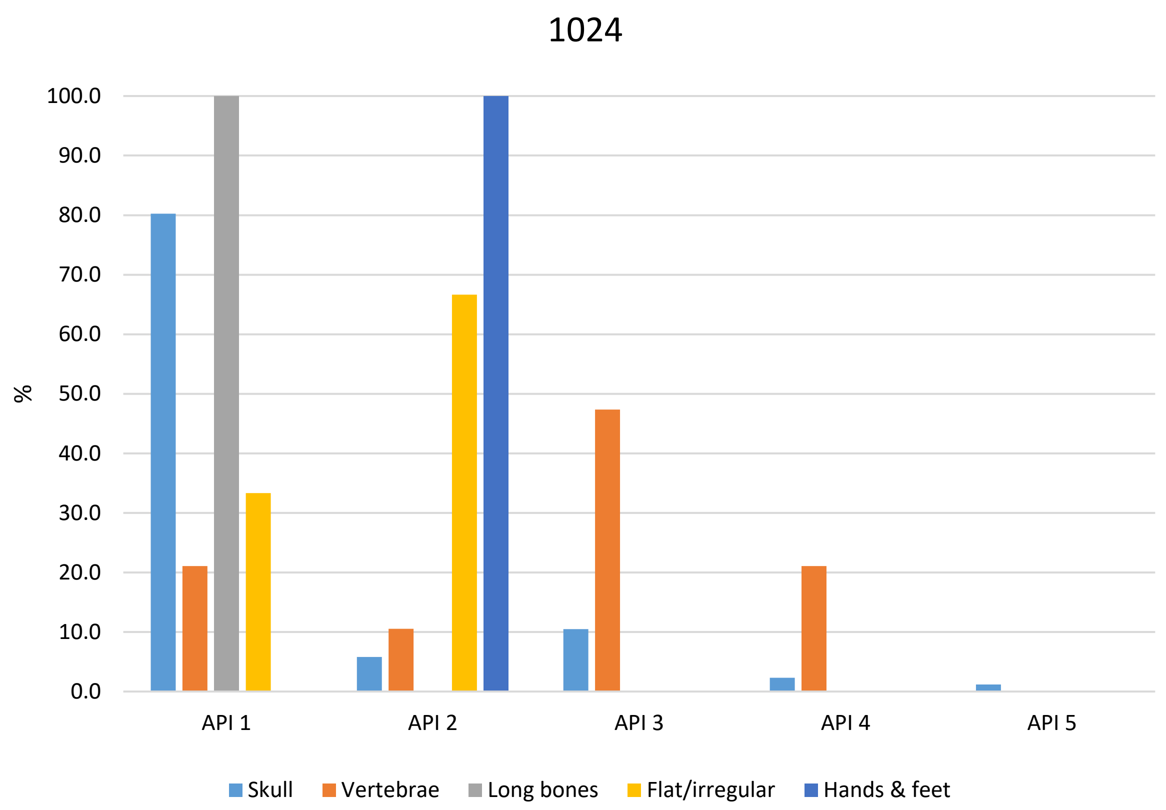

Figure 29: Element completeness (API) according to bone type in (1024), in the Shrine.

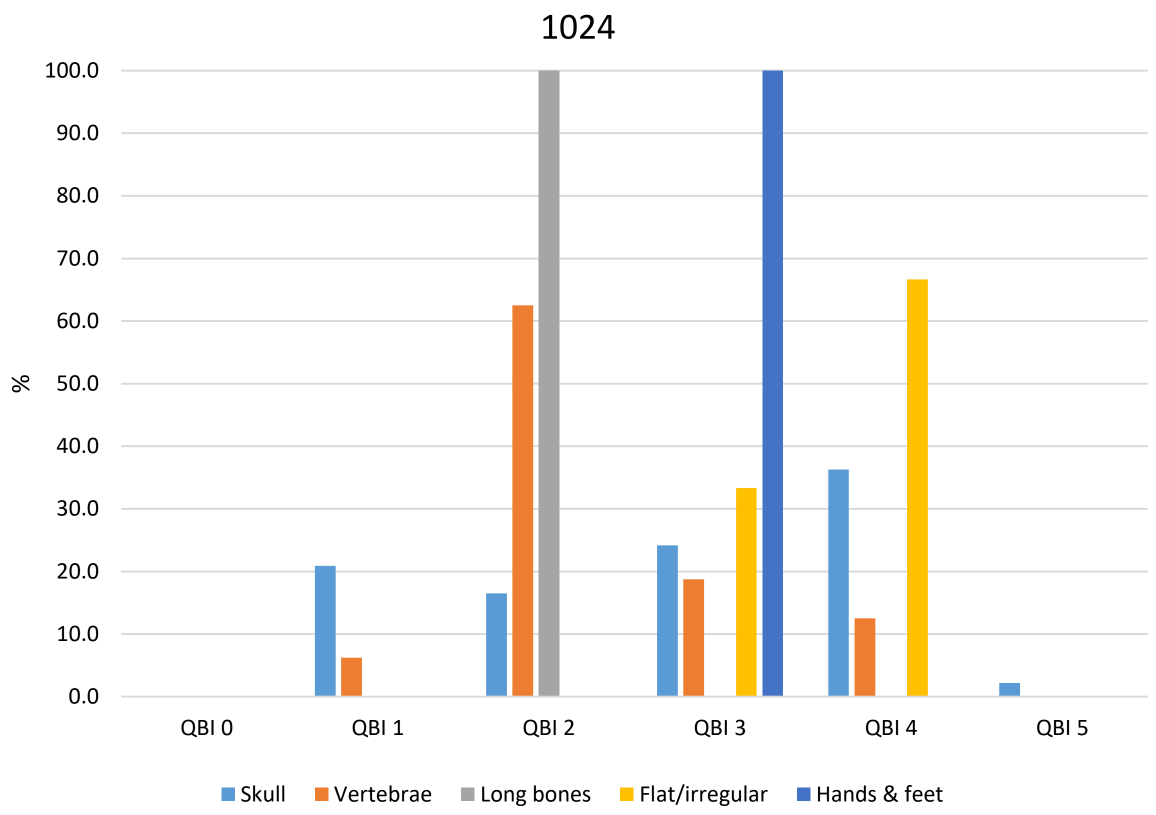

Figure 30: Element preservation (QBI) according to bone type in (1024), in the Shrine.

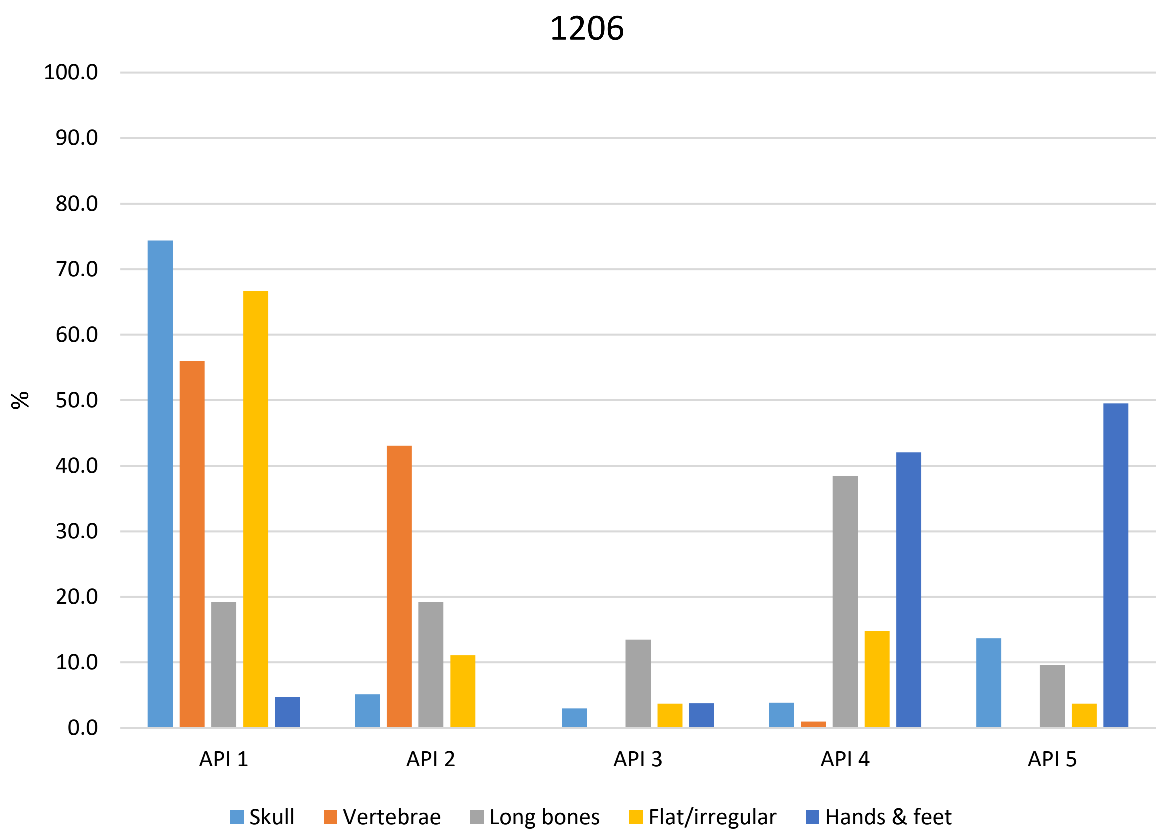

Figure 31: Element completeness (API) according to bone type in (1206), in the Shrine.

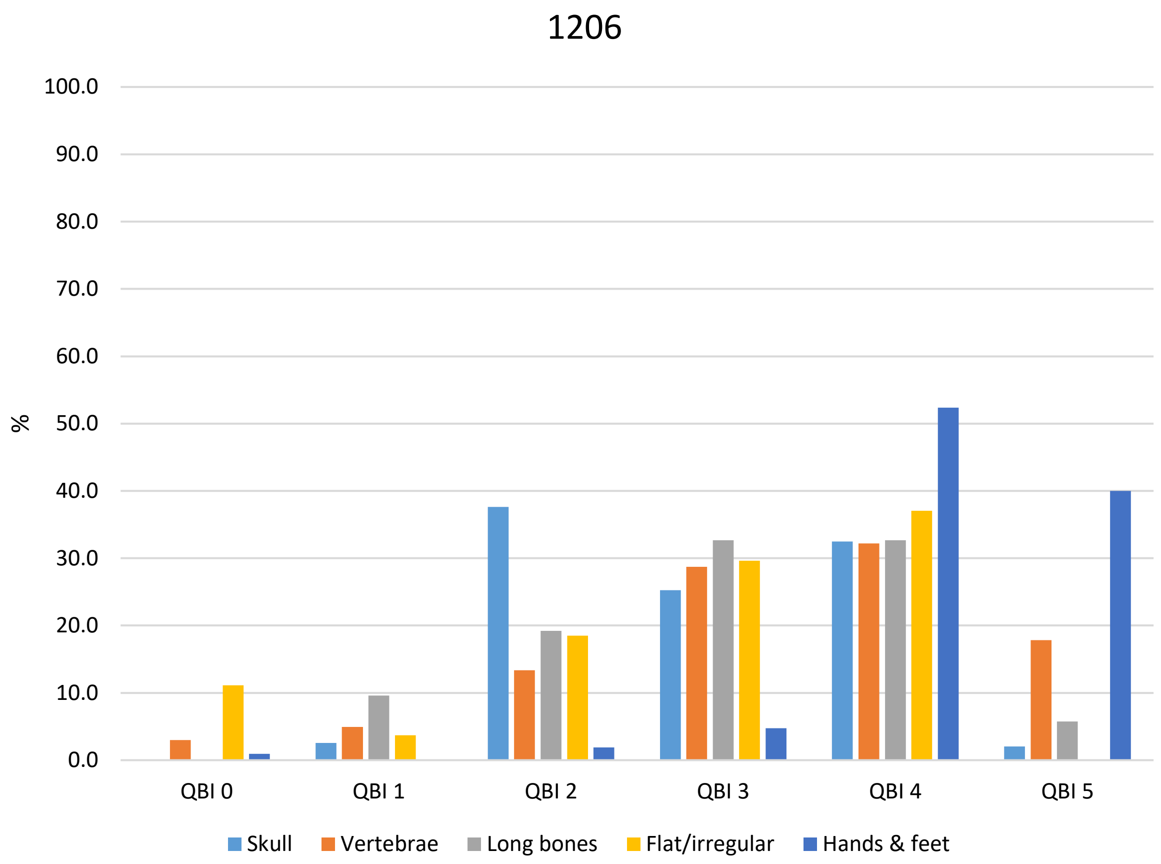

Figure 32: Element preservation (QBI) according to bone type in (1206), in the Shrine.

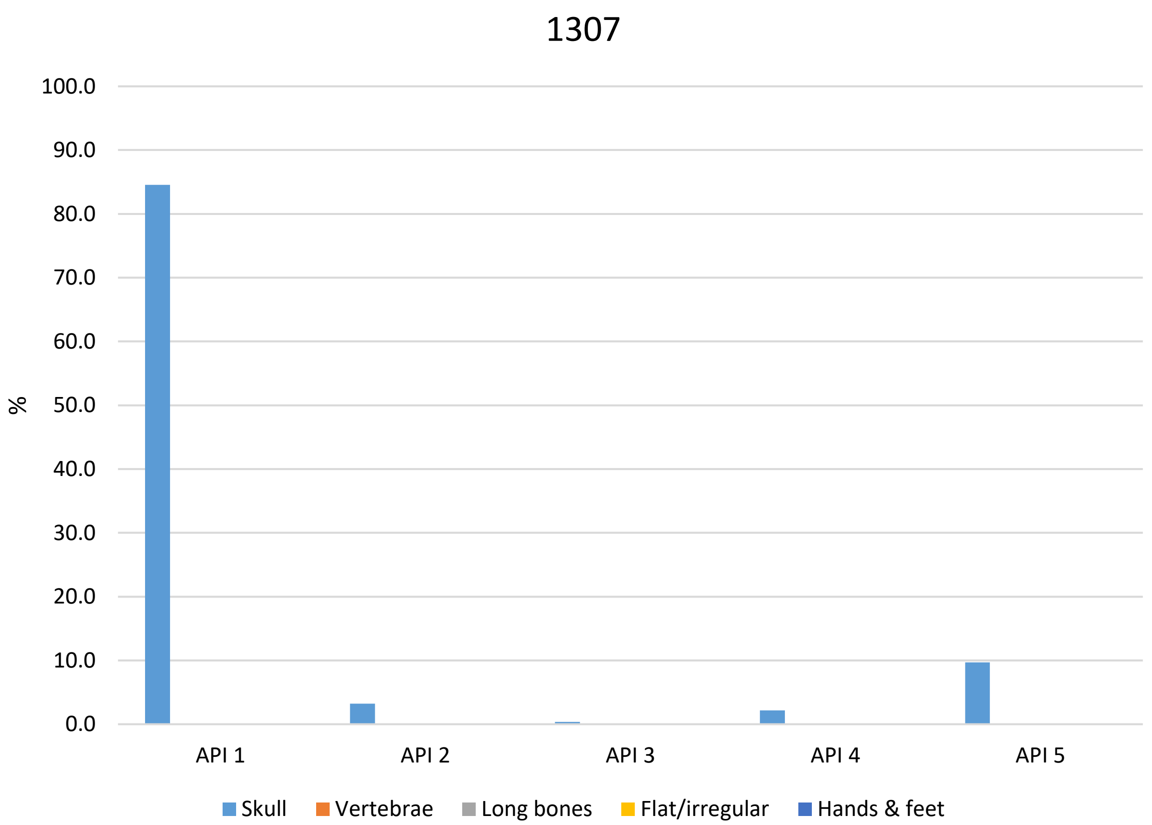

Figure 33: Element completeness (API) according to bone type in (1307), in the Shrine.

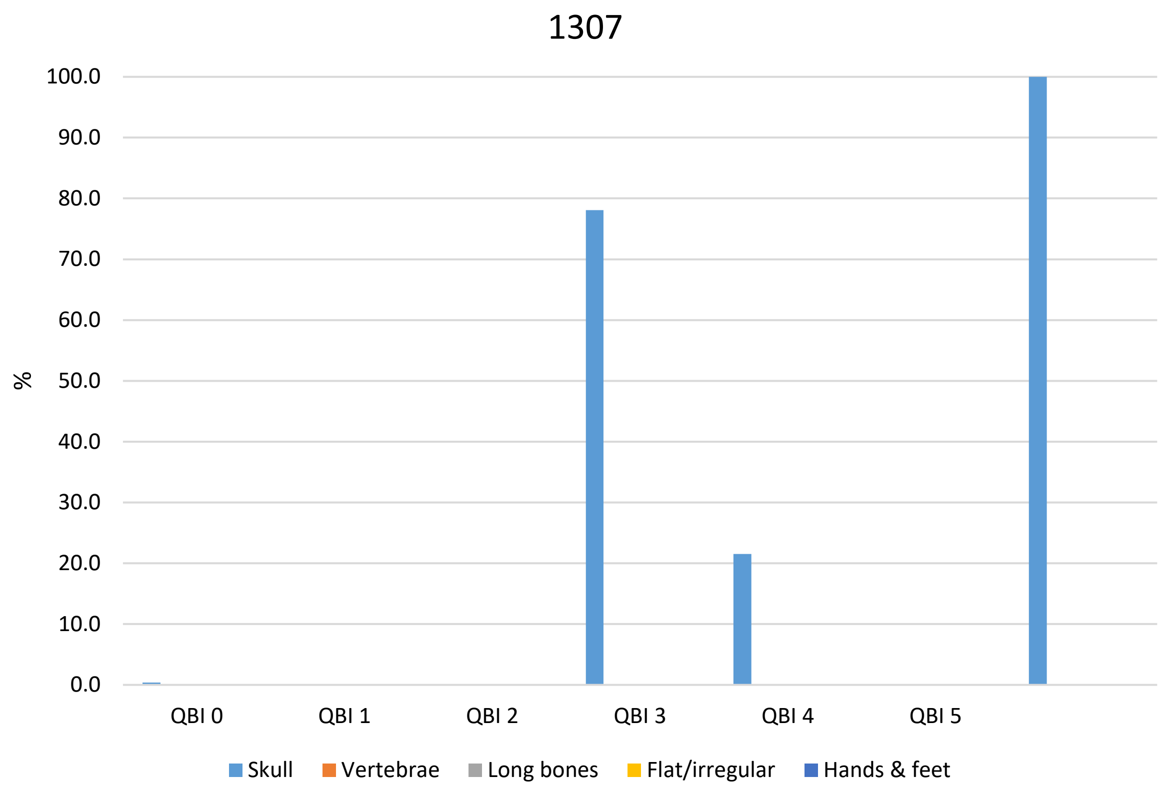

Figure 34: Element preservation (QBI) according to bone type in (1307), in the Shrine.

3.3.6 Central pit

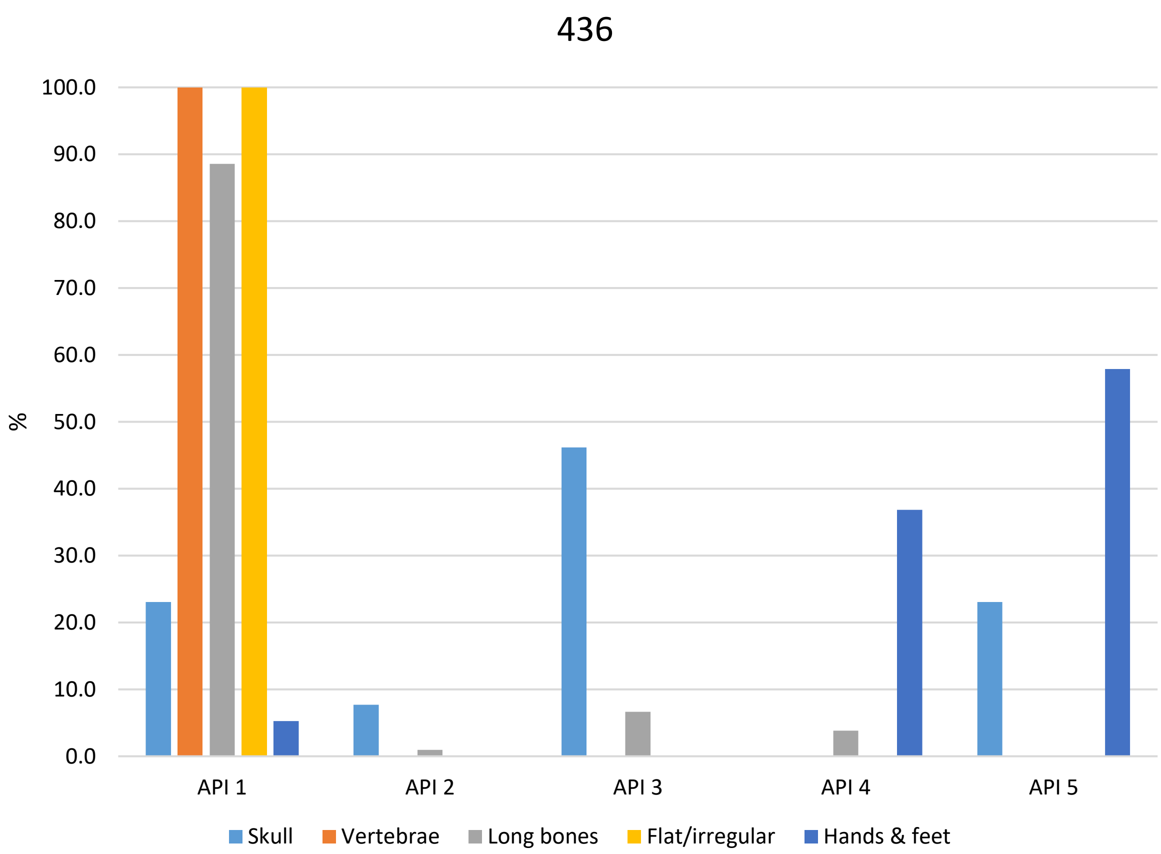

Figure 35: Element completeness (API) according to bone type in (436), in the Central pit.

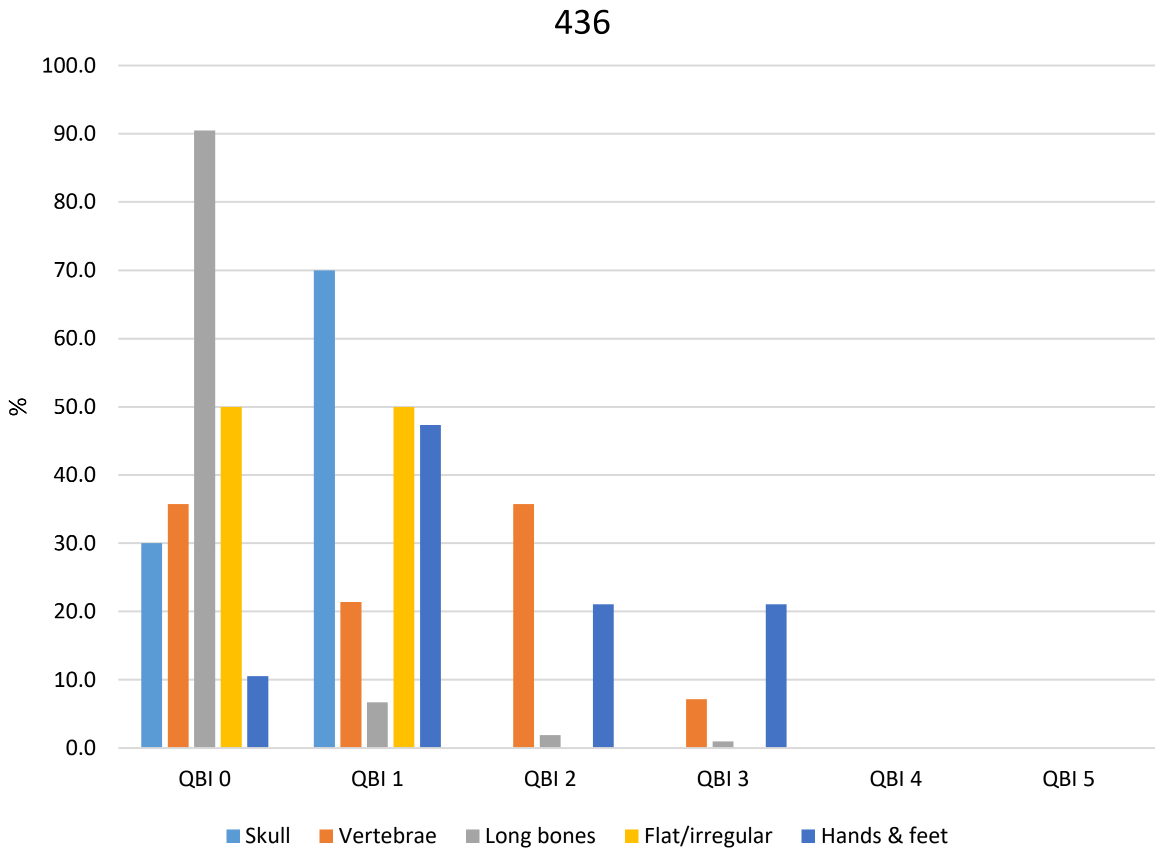

Figure 36: Element preservation (QBI) according to bone type in (436), in the Central pit.

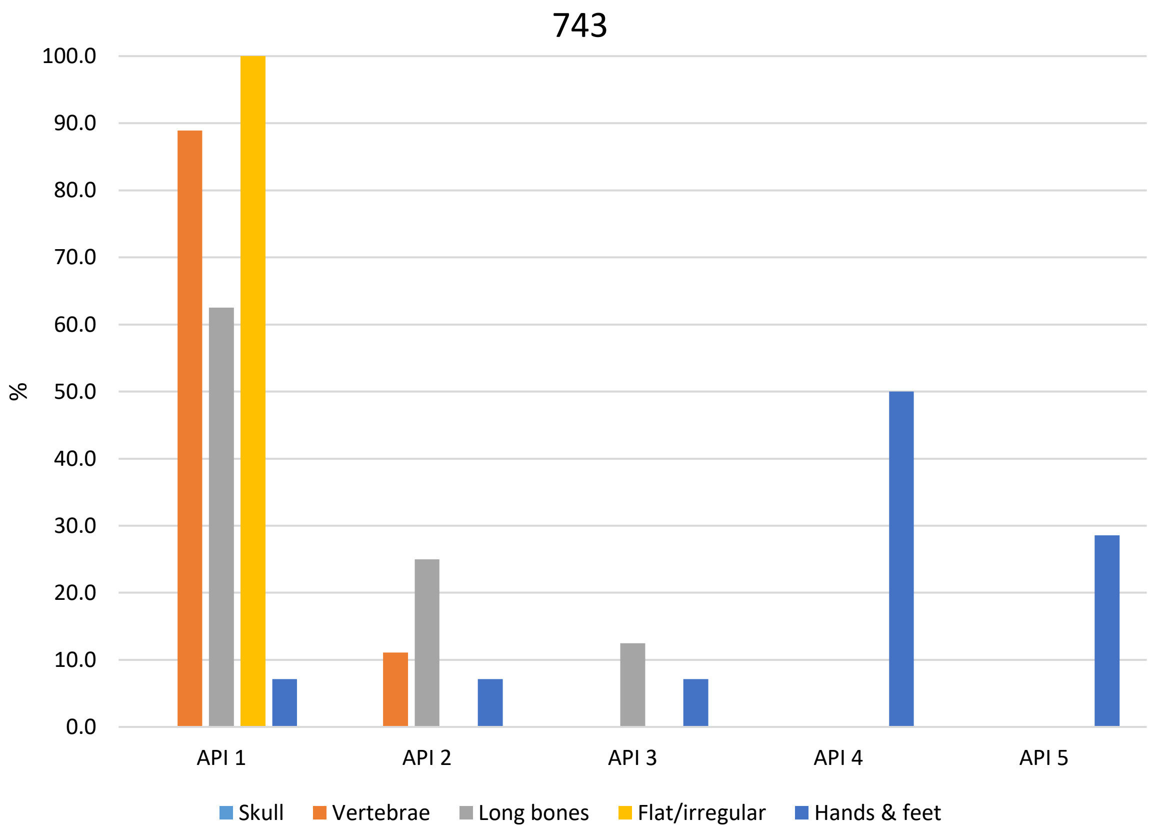

Figure 37: Element completeness (API) according to bone type in (74390), in the Central pit.

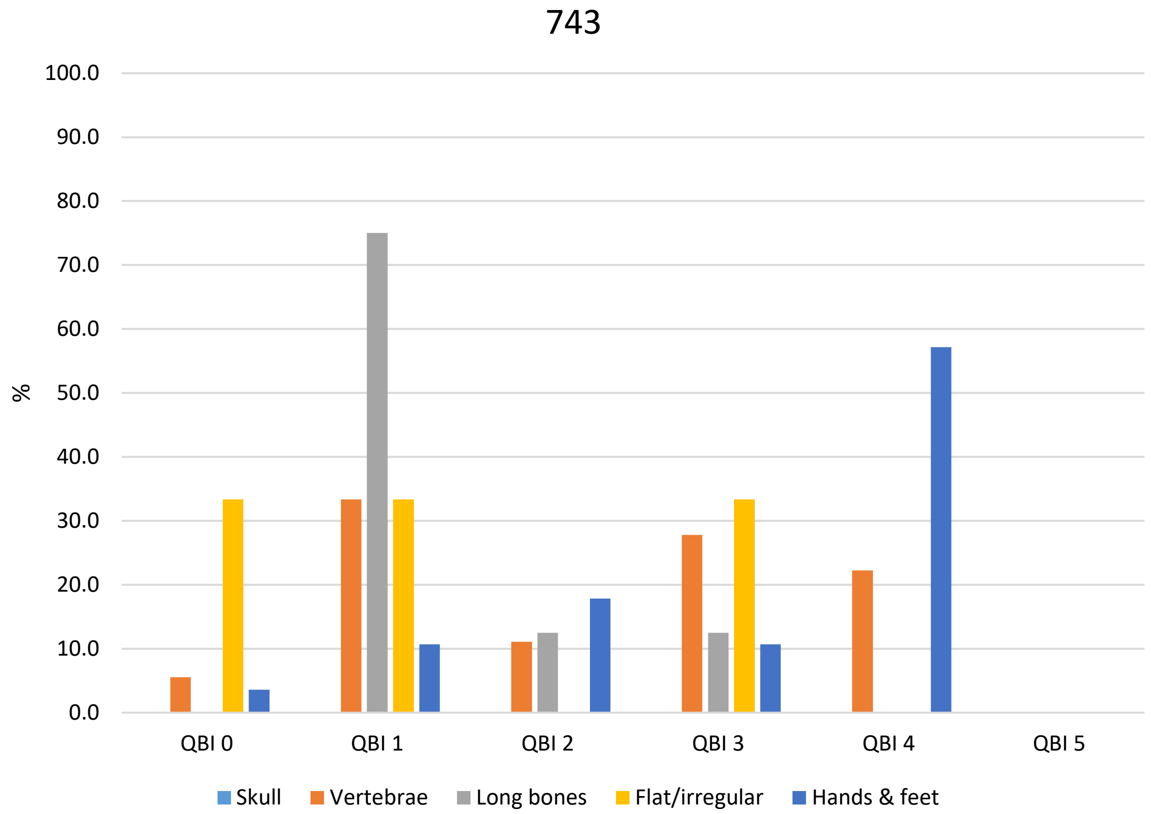

Figure 38: Element preservation (QBI) according to bone type in (743), in the Central pit.

3.3.6 Southwest niche

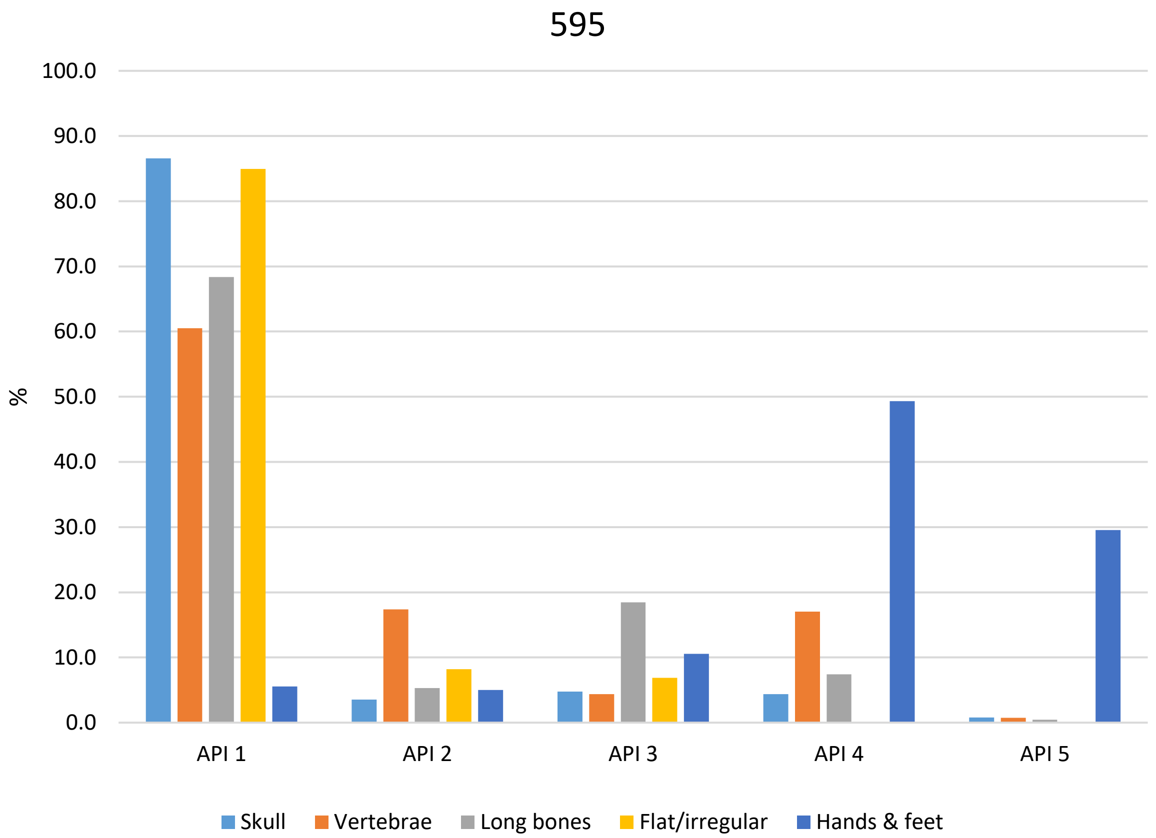

Figure 39: Element completeness (API) according to bone type in (595), in the Southwest niche.

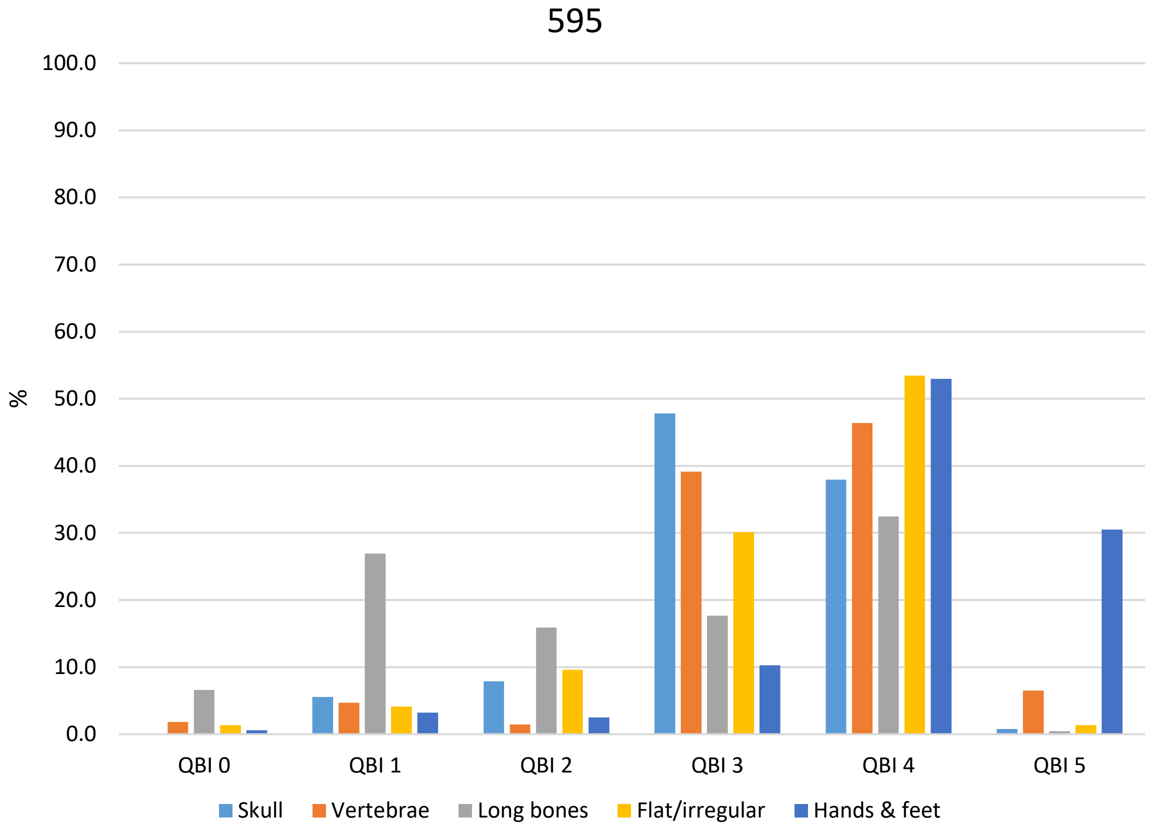

Figure 40: Element preservation (QBI) according to bone type in (595), in the Southwest niche.

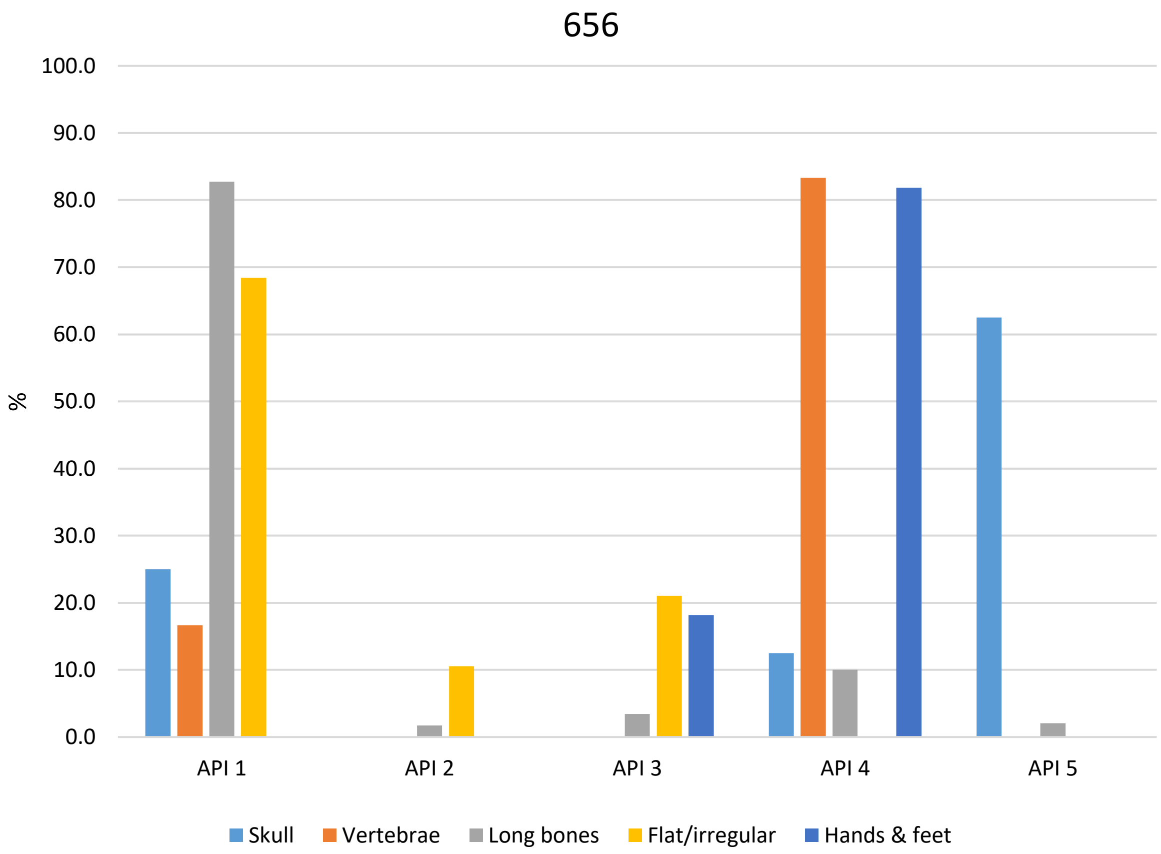

Figure 41: Element completeness (API) according to bone type in (656), in the Southwest niche.

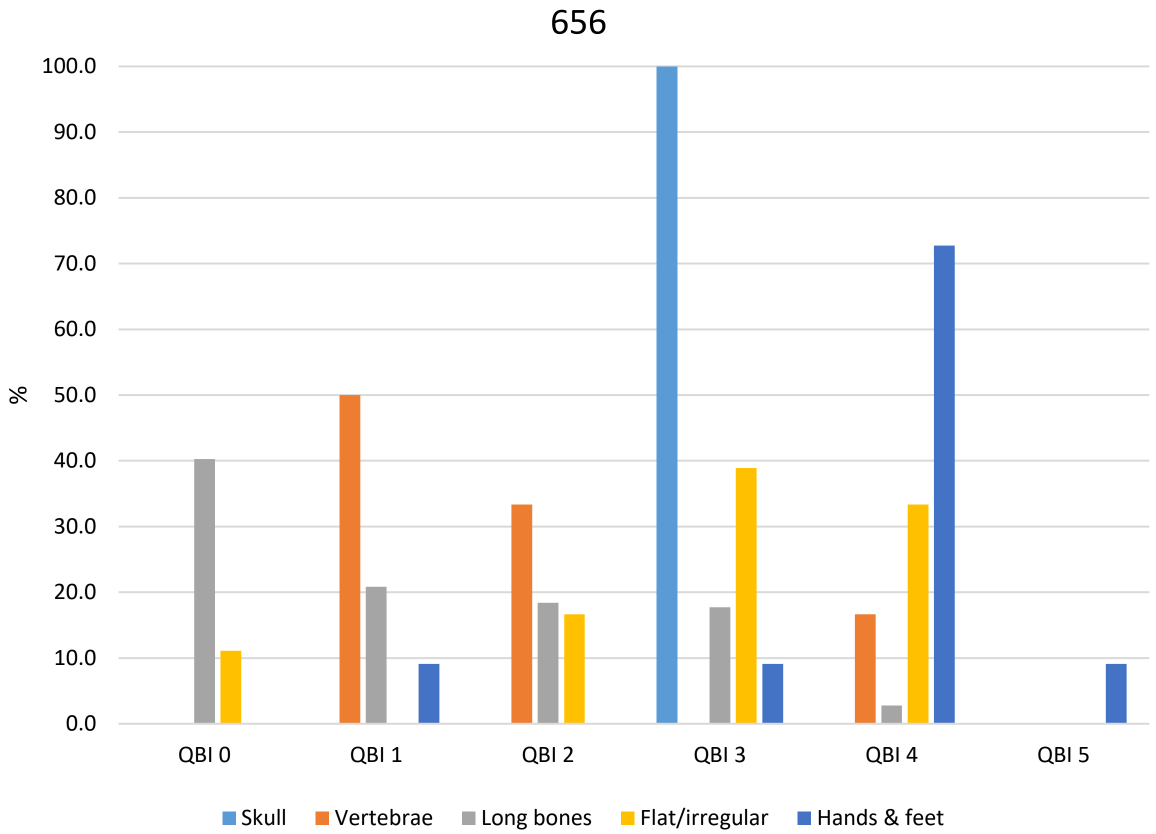

Figure 42: Element preservation (QBI) according to bone type in (656), in the Southwest niche.

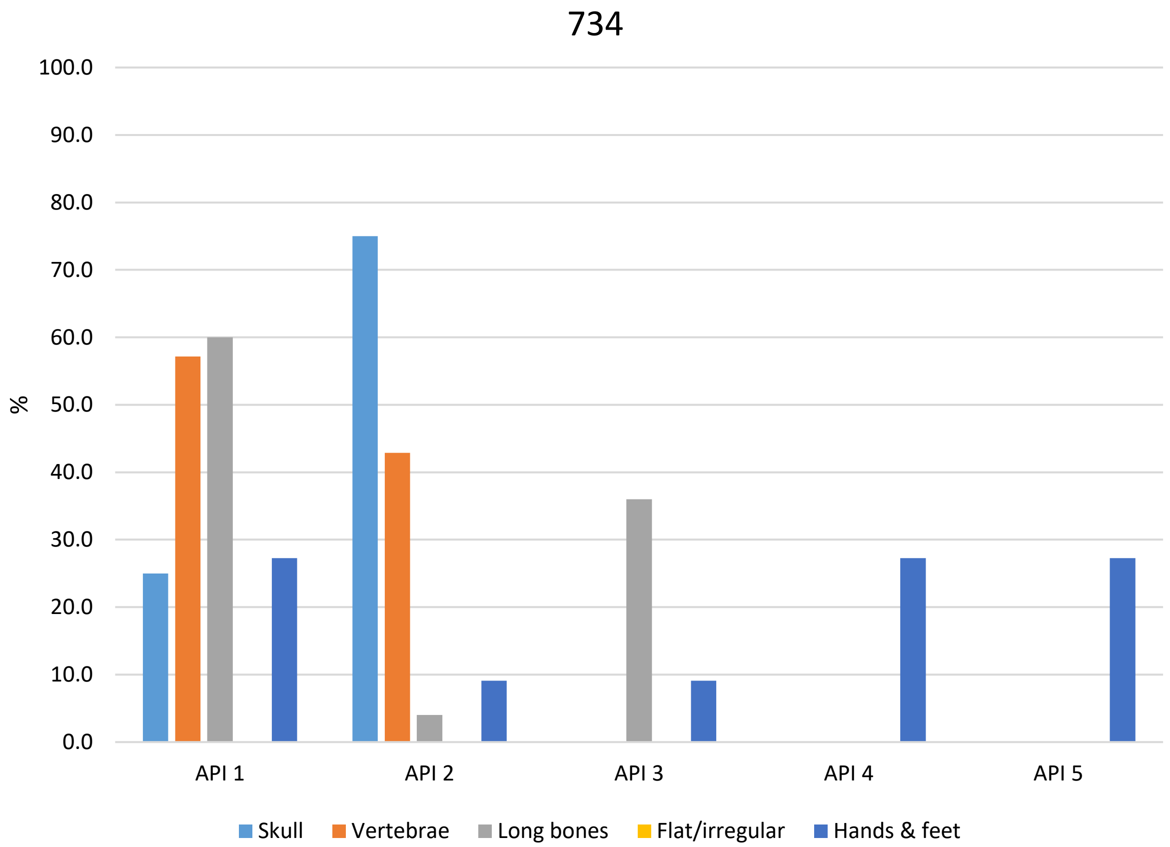

Figure 43: Element completeness (API) according to bone type in (734), in the Southwest niche.

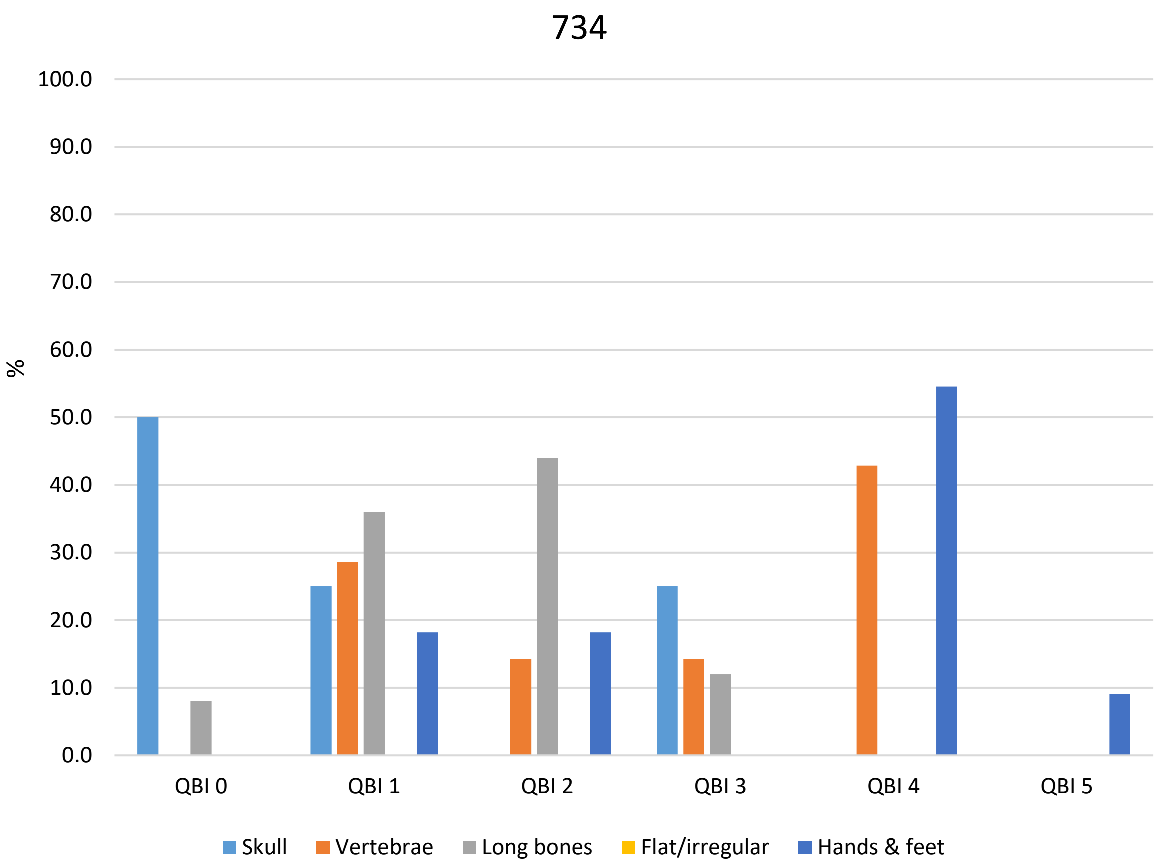

Figure 44: Element preservation (QBI) according to bone type in (734), in the southwest niche.

3.4 MNE, MNI and BRI tables

3.4.1 Rock-cut tomb: (276)

Element	NISP	MNE Left	MNE Axial/ unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	215	-	3	-	37.5	-	3	71.7
Mandible	12	3	-	2	31.3	1	2	2.4
Hyoid	0	-	0	-	0.0	-	-	0
Clavicle	10	1	-	2	18.8	-	2	3.3
Cervicals	11	-	7	-	12.5	-	3	1.6
Thoracics	39	-	10	-	10.4	3	-	3.9
Lumbars	14	-	5	-	12.5	1	-	2.8
Ribs	91	9	8	9	13.5	1	2	3.4
Scapula	16	1	-	1	12.5	-	1	8
Manubrium	1	-	1	-	12.5	-	1	1
Sternum	2	-	1	-	12.5	-	1	2
Humerus	12	1	-	2	18.8	1	1	4
Radius	6	0	-	2	12.5	-	2	3
Ulna	15	2	-	1	18.8	-	2	5
Carpals	4	4	-	0	3.1	-	1	1
Metacarpals	16	4	3	7	17.5	-	4	1.5
Manual phalanges	24	-	24	-	10.7	1	2	1
Pelvis	13	2	2	1	31.3	2	1	2.6
Sacrum	7	-	2	-	25.0	-	2	3.5
Coccyx	0	-	0	-	0.0	-	-	0
Femur	35	3	-	2	31.3	3	1	7
Patella	0	0	-	0	0.0	-	-	0
Tibia	37	2	-	1	18.8	1	1	12.3
Fibula	4	1	-	1	12.5	-	1	2
Calcaneus	4	1	-	1	12.5	-	1	2
Talus	10	5	-	2	43.8	-	5	1.4
Tarsals	10	6	-	3	11.3	-	2	1.1
Metatarsals	18	6	1	8	18.8	2	2	1.2
Pedal phalanges	17	-	15	-	6.7	1	2	1.1

Table 47: MNE, MNI, BRI and FI for (276) in the West chamber of the rock-cut tomb.

3.4.2 Rock-cut tomb: (326)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	127	-	5	-	71.4	1	4	25.4
Mandible	10	2	2	2	42.9	-	2	1.7
Hyoid	0	-	0	-	0.0	-	-	0
Clavicle	10	2	-	3	35.7	-	3	2
Cervicals	26	-	7	-	14.3	-	2	3.7
Thoracics	37	-	13	-	15.5	1	1	2.8
Lumbars	13	-	4	-	11.4	-	1	3.3
Ribs	133	11	1	10	13.1	1	2	6
Scapula	17	1	-	1	14.3	-	1	8.5
Manubrium	0	-	0	-	0.0	-	-	0
Sternum	3	-	2	-	28.6	1	1	1.5
Humerus	15	1	2	1	28.6	2	1	3.75
Radius	22	3	-	2	35.7	1	2	4.4
Ulna	20	2	-	2	28.6	-	2	5
Carpals	14	4	2	7	23.2	1	3	1.1
Metacarpals	28	11	2	13	37.1	2	5	1.1
Manual phalanges	49	-	49	-	25.0	2	3	1
Pelvis	19	1	-	2	21.4	1	1	6.3
Sacrum	9	-	2	-	28.6	-	3	4.5
Coccyx	2	-	1	-	14.3	-	1	2
Femur	22	1	1	1	21.4	1	1	7.3
Patella	9	5	-	3	57.1	-	5	1.1
Tibia	18	1	-	1	14.3	-	1	9
Fibula	17	2	-	1	21.4	1	1	5.7
Calcaneus	8	4	-	2	42.9	-	4	1.3
Talus	8	2	-	4	42.9	-	4	1.3
Tarsals	27	14	-	13	38.6	-	5	1
Metatarsals	40	11	2	19	45.7	-	5	1.25
Pedal phalanges	45	-	44	-	22.4	1	3	1

Table 48: MNE, MNI, BRI and FI for (326) in the East chamber of the rock-cut tomb.

3.4.3 North bone pit: (354)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	118	-	2	-	66.7	-	2	59
Mandible	0	-	-	-	0.0	-	-	
Hyoid	0	-	-	-	0.0	-	-	
Clavicle	0	-	-	-	0.0	-	-	
Cervicals	0	-	-	-	0.0	-	-	
Thoracics	0	-	-	-	0.0	-	-	
Lumbars	0	-	-	-	0.0	-	-	
Ribs	0	-	-	-	0.0	-	-	
Scapula	0	-	-	-	0.0	-	-	
Manubrium	0	-	-	-	0.0	-	-	
Sternum	0	-	-	-	0.0	-	-	
Humerus	0	-	-	-	0.0	-	-	
Radius	0	-	-	-	0.0	-	-	
Ulna	0	-	-	-	0.0	-	-	
Carpals	0	-	-	-	0.0	-	-	
Metacarpals	0	-	-	-	0.0	-	-	
Manual phalanges	0	-	-	-	0.0	-	-	
Pelvis	16	2	-	1	50.0	-	3	5.3
Sacrum	1	-	1	-	33.3	-	1	1
Coccyx	0	-	-	-	0.0	-	-	
Femur	0	-	-	-	0.0	-	-	
Patella	0	-	-	-	0.0	-	-	
Tibia	0	-	-	-	0.0	-	-	
Fibula	1	0	-	1	16.7	-	1	1
Calcaneus	0	-	-	-	0.0	-	-	
Talus	0	-	-	-	0.0	-	-	
Tarsals	0	-	-	-	0.0	-	-	
Metatarsals	0	-	-	-	0.0	-	-	
Pedal phalanges	0	-	-	-	0.0	-	-	

Table 49: MNE, MNI, BRI and FI for (354) in the North bone pit.

3.4.4 North bone pit: (799)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	176	-	5	-	56	1	4	35.2
Mandible	29	7	1	7	83	3	6	1.9
Clavicle	18	5	-	2	39	2	5	2.6
Hyoid	1	-	1	-	11	-	1	1
Cervicals	46	-	14	-	22	-	4	3.3
Thoracics	127	-	22	-	20	1	1	5.8
Lumbars	52	-	12	-	27	2	2	4.3
Ribs	586	15	4	31	23	2	3	11.7
Scapula	45	7	-	3	56	1	6	4.5
Manubrium	2	-	2	-	22	-	1	1
Sternum	4	-	3	-	33	1	2	1.3
Humerus	22	5	-	5	56	1	4	2.2
Radius	31	3	-	4	39	-	4	4.4
Ulna	27	3	-	3	33	1	2	4.5
Carpals	16	8	-	8	22	-	1	1
Metacarpals	40	11	-	20	34	1	6	1.3
Manual phalanges	53	-	49	-	19	-	2	1.1
Pelvis	47	4	3	4	61	2	4	4.3
Sacrum	13	-	5	-	56	-	5	2.6
Coccyx	2	-	1	-	11	-	1	2
Femur	22	5	1	3	50	2	2	2.4
Patella	4	2	-	2	22	-	2	1
Tibia	16	2	1	3	33	-	3	2.7
Fibula	38	5	6	4	83	1	4	2.5
Calcaneus	11	3	-	5	44	-	5	1.375
Talus	6	2	-	4	33	-	4	1
Tarsals	21	10	-	9	42	-	3	1.1
Metatarsals	37	15	2	13	33	1	4	1.2
Pedal phalanges	31	-	31	-	12	-	2	1

Table 50: MNE, MNI, BRI and FI for (799) of the North bone pit.

3.4.5 Display Zone: (783)

Element	NISP	MNE Left	MNE Axial/ unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	901	-	12	-	39	11	1	75.1
Mandible	48	-	7	-	25	6	1	6.9
Hyoid	5	-	5	-	18	2	-	1
Clavicle	42	6	1	9	29	8	2	2.625
Cervicals	164	-	55	-	57	9	1	3
Thoracics	342	-	63	-	19	10	1	5.4
Lumbars	77	-	34	-	24	8	2	2.3
Ribs	923	69	3	67	21	5	2	6.6
Scapula	45	3	-	10	23	9	1	3.5
Manubrium	2	-	2	-	7	1	1	1
Sternum	39	-	5	-	18	4	1	7.8
Humerus	55	10	-	5	27	9	1	3.7
Radius	51	6	3	7	29	4	1	3.2
Ulna	40	6	2	7	27	7	-	2.7
Carpals	56	17	10	16	12	2	3	5.9
Metacarpals	136	22	4	28	19	9	6	.5
Manual phalanges	251	-	240	-	31	6	5	1
Pelvis	89	8	-	5	23	7	1	6.8
Sacrum	35	-	2	-	7	1	1	17.5
Coccyx	4	-	4	-	14	2	-	1
Femur	78	6	-	5	20	6	1	7.1
Patella	20	8	2	6	29	6	8	1.25
Tibia	58	4	1	6	20	6	1	5.3
Fibula	71	3	4	3	18	4	1	6.5
Calcaneus	14	8	-	5	23	5	3	1.2
Talus	17	7	2	6	27	4	4	1.1
Tarsals	77	27	5	31	23	4	9	1.2
Metatarsals	116	23	36	33	33	3	10	1.3
Pedal phalanges	100	-	97	-	12	4	4	1

Table 51: MNE, MNI, BRI and FI for (783) in the Display zone.

3.4.6 Deep zone: (951)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	652	-	4	-	57	2	2	163
Mandible	10	-	3	-	43	2	1	3.3
Clavicle	6	2	-	1	21	1	1	2
Cervicals	26	-	7	-	14	-	3	3.7
Thoracics	25	-	6	-	7	-	1	4.2
Lumbars	17	-	7	-	20	-	2	2.4
Ribs	84	9	-	5	8	-	1	6
Scapula	21	2	-	1	11	1	1	7
Manubrium	0	-	0	-	0	-	-	0
Sternum	2	-	1	-	14	-	1	2
Humerus	15	3	-	3	21	-	3	2.5
Radius	19	1	-	1	7	-	1	9.5
Ulna	24	1	1	1	11	1	1	8
Carpals	0	0	-	0	0	-	-	0
Metacarpals	9	3	-	3	9	-	2	1.5
Manual phalanges	3	-	3	-	1.5	-	1	1
Pelvis	25	2	-	1	11	1	1	8.3
Sacrum	3	-	2	-	29	1	1	1.5
Coccyx	0	-	0	-	0	-	-	0
Femur	42	2	-	6	29	2	4	5.25
Patella	7	3	-	0	11	-	3	2.3
Tibia	28	2	-	1	11	1	1	9.3
Fibula	20	1	-	1	7	-	1	10
Calcaneus	2	2	-	0	7	-	2	1
Talus	5	0	-	4	14	-	4	1.25
Tarsals	2	0	-	1	1	-	1	2
Metatarsals	3	0	1	2	3	1	1	1
Pedal phalanges	3	-	3	-	2	1	1	1

Table 52: MNE, MNI, BRI and FI for (951) in the Deep zone.

3.4.7 Deep zone: (1144)

Element	NISP	MNE Left	MNE Axial/Unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	42	-	2	-	100	1	1	21
Mandible	0	-	0	-	0	-	-	0
Cervicals	1	-	1	-	7	1	-	1
Thoracics	6	-	4	-	17	1	1	1.5
Lumbars	2	-	1	-	10	-	1	2
Ribs	29	2	-	3	13	-	1	5.8
Clavicle	0	0	-	0	0	-	-	0
Scapula	2	1	-	0	25	-	1	2
Sternum	0	-	0	-	0	-	-	0
Humerus	0	0	-	0	0	-	-	0
Radius	0	0	-	0	0	-	-	0
Ulna	1	-	1	-	25	1	-	1
Carpals	1	-	1	-	3	-	1	1
Metacarpals	5	0	-	2	5	1	1	2.5
Manual phalanges	8	-	8	-	14	1	1	1
Pelvis	2	1	-	1	50	1	-	1
Sacrum	1	-	1	-	50	1	-	1
Coccyx	2	-	1	-	50	-	1	2
Femur	3	1	-	0	25	1	-	3
Patella	0	0	-	0	0	-	-	0
Tibia	2	1	-	0	25	1	-	2
Fibula	1	0	1	0	25	-	1	1
Calcaneus	1	1	-	0	25	-	1	1
Talus	0	0	-	0	0	-	-	0
Tarsals	2	0	-	2	10	-	1	1
Metatarsals	7	3	1	2	15	1	1	1.2
Pedal phalanges	6	-	6	-	11	1	1	1

Table 53: MNE, MNI, BRI and FI for (1144) in the Deep zone.

3.4.8 Deep zone: (1307)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	246	-	2	-	100	1	1	123
Mandible	5	-	2	-	100	1	1	2.5
Cervicals	0	-	-	-	0	-	-	0
Thoracics	0	-	-	-	0	-	-	0
Lumbars	0	-	-	-	0	-	-	0
Ribs	0	-	-	-	0	-	-	0
Clavicle	0	-	-	-	0	-	-	0
Scapula	0	-	-	-	0	-	-	0
Sternum	0	-	-	-	0	-	-	0
Humerus	0	-	-	-	0	-	-	0
Radius	0	-	-	-	0	-	-	0
Ulna	0	-	-	-	0	-	-	0
Carpals	0	-	-	-	0	-	-	0
Metacarpals	0	-	-	-	0	-	-	0
Manual Phalanges	0	-	-	-	0	-	-	0
Pelvis	0	-	-	-	0	-	-	0
Sacrum	0	-	-	-	0	-	-	0
Coccyx	0	-	-	-	0	-	-	0
Femur	0	-	-	-	0	-	-	0
Patella	0	-	-	-	0	-	-	0
Tibia	0	-	-	-	0	-	-	0
Fibula	0	-	-	-	0	-	-	0
Calcaneus	0	-	-	-	0	-	-	0
Talus	0	-	-	-	0	-	-	0
Tarsals	0	-	-	-	0	-	-	0
Metatarsals	0	-	-	-	0	-	-	0
Pedal phalanges	0	-	-	-	0	-	-	0

Table 54: MNE, MNI, BRI and FI for (1307) in the Deep zone.

3.4.9 Shrine: (960)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	262	-	6	-	24	4	2	43.7
Mandible	14	3	1	4	16	3	1	1.75
Hyoid	2	-	2	-	8	1	1	1
Clavicle	29	9	-	6	30	5	4	1.9
Cervicals	75	-	45	-	14.3	4	7	1.7
Thoracics	93	-	39	-	13	-	4	2.4
Lumbars	45	-	19	-	1.5	-	4	2.4
Ribs	436	40	-	37	12.8	-	4	5.7
Scapula	34	5	-	4	18	4	1	3.8
Manubrium	2	-	2	-	8	-	2	1
Sternum	9	-	3	-	12	2	1	3
Humerus	25	5	-	4	18	3	2	2.8
Radius	11	2	1	5	16	4	2	1.375
Ulna	34	6	-	10	32	8	4	2.125
Carpals	58	23	9	25	14.3	1	8	1
Metacarpals	78	26	16	28	28	2	6	1.1
Manual phalanges	145	-	138	-	19.7	3	6	1.1
Pelvis	82	6	-	5	22	4	2	7.5
Sacrum	28	-	5	-	20	3	2	5.6
Coccyx	4	-	3	-	12	-	3	1.3
Femur	46	4	-	9	26	7	2	3.5
Patella	17	10	1	4	30	1	10	1.1
Tibia	37	4	1	6	22	4	2	3.4
Fibula	26	5	1	5	22	5	2	2.4
Calcaneus	11	6	-	2	16	1	5	1.1
Talus	12	6	1	3	20	-	6	1.2
Tarsals	65	28	3	27	23.2	-	8	1.1
Metatarsals	95	31	28	23	32.8	2	9	1.2
Pedal phalanges	113	-	110	-	15.7	1	7	1

Table 55: MNE, MNI, BRI and FI for (960) in the Shrine.

3.4.10 Shrine: (1024)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	89	-	2	-	100	1	1	44.5
Mandible	0	-	0	-	0	-	-	0
Clavicle	0	0	-	0	0	-	-	0
Cervicals	3	-	2	-	14	-	1	1.5
Thoracics	11	-	3	-	12.5	-	1	3.7
Lumbars	2	-	1	-	10	-	1	2
Rib	65	5	-	1	12.5	1	1	10.8
Scapula	2	1	-	0	25	-	1	2
Manubrium	0	-	0	-	0	-	-	0
Sternum	0	-	0	-	0	-	-	0
Humerus	1	0	1	0	25	-	1	1
Radius	0	0	-	0	0	-	-	0
Ulna	0	0	-	0	0	-	-	0
Carpals	0	0	-	0	0	-	-	0
Metacarpals	0	0	-	0	0	-	-	0
Manual phalanges	1	-	1	-	1.79	-	1	1
Pelvis	1	0	-	1	25	1	-	1
Sacrum	0	-	0	-	0	-	-	0
Coccyx	0	-	0	-	0	-	-	0
Femur	0	0	-	0	0	-	-	0
Patella	0	0	-	0	0	-	-	0
Tibia	0	0	-	0	0	-	-	0
Fibula	0	0	-	0	0	-	-	0
Calcaneus	0	0	-	0	0	-	-	0
Talus	0	0	-	0	0	-	-	0
Tarsals	0	0	-	0	0	-	-	0
Metatarsals	0	0	-	0	0	-	-	0
Pedal phalanges	0	-	0	-	0	-	-	0

Table 56: MNE, MNI, BRI and FI for (1024) in the Shrine.

3.4.11 Shrine: (1206)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	184	-	6	-	66.7	5	1	30.7
Mandible	8	-	3	-	33.3	3	-	2.7
Hyoid	0	-	0	-	0.0	-	-	0
Clavicle	12	4	-	6	55.6	7	-	1.2
Cervicals	49	-	33	-	52.4	3	-	1.5
Thoracics	101	-	41	-	38.0	3	1	2.5
Lumbars	41	-	16	-	35.6	3	1	2.6
Ribs	134	37	1	39	35.6	4	2	1.7
Scapula	9	2	-	5	38.9	4	1	1.3
Manubrium	0	-	0	-	0.0	-	-	0
Sternum	0	-	0	-	0.0	-	-	0
Humerus	5	1	-	2	16.7	1	1	1.7
Radius	6	3	-	3	33.3	3	1	1
Ulna	8	4	-	3	38.9	4	1	1.1
Carpals	16	4	2	10	11.1	-	2	1
Metacarpals	25	5	9	8	24.4	3	2	1.1
Manual phalanges	47	-	43	-	17.1	4	1	1.1
Pelvis	5	2	-	1	16.7	2	-	1.7
Sacrum	12	-	3	-	33.3	3	-	4
Coccyx	1	-	1	-	11.1	1	-	1
Femur	8	2	1	1	22.2	2	1	2
Patella	0	0	-	0	0.0	-	-	0
Tibia	4	1	-	1	11.1	-	1	2
Fibula	6	2	-	1	16.7	2	1	0
Calcaneus	0	0	-	0	0.0	-	-	0
Talus	3	-	3	-	16.7	3	-	1
Tarsals	2	1	1	0	2.2	1	1	1
Metatarsals	8	0	7	0	7.8	1	1	1.1
Pedal phalanges	7	-	7	-	2.8	2	1	1

Table 57: MNE, MNI, BRI and FI for (1206) in the Shrine.

3.4.12 Central pit: (436)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	6	-	1	-	25	-	1	6
Mandible	4	-	1	-	25	-	1	4
Hyoid	0	-	0	-	0	-	-	0
Clavicle	1	0	-	1	12.5	-	1	1
Cervicals	3	-	1	-	3.6	-	1	3
Thoracics	1	-	1	-	2.1	-	-	1
Lumbars	0	-	0	-	0	-	-	0
Ribs	78	4	-	3	7.3	1	3	11.1
Scapula	2	1	-	0	12.5	-	1	2
Manubrium	0	-	0	-	0	-	-	0
Sternum	0	-	0	-	0	-	-	0
Humerus	6	1	-	1	25	-	1	3
Radius	8	1	1	1	37.5	-	2	2.7
Ulna	5	2	-	0	25	-	2	2.5
Carpals	2	0	2	0	3.1	-	1	1
Metacarpals	9	0	6	0	15	-	3	1.5
Manual phalanges	8	-	8	-	7.1	-	1	1
Pelvis	0	0	-	0	0	-	-	0
Sacrum	0	-	0	-	0	-	-	0
Coccyx	0	-	0	-	0	-	-	0
Femur	2	0	1	0	12.5	-	1	2
Patella	0	0	-	0	0	-	-	0
Tibia	0	0	-	0	0	-	-	0
Fibula	1	0	1	0	12.5	-	1	1
Calcaneus	0	0	-	0	0	-	-	0
Talus	0	0	-	0	0	-	-	0
Tarsals	0	0	-	0	0	-	-	0
Metatarsals	0	0	-	0	0	-	-	0
Pedal phalanges	0	-	0	-	0	-	-	0

Table 58: MNE, MNI, BRI and FI for (436) in the Central pit.

3.4.13 Central pit: (743)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	0	-	0	-	0	-	-	0
Mandible	0	-	0	-	0	-	-	0
Hyoid	2	-	1	-	33.3	1		2
Clavicle	0	0	-	0	0	-	-	0
Cervicals	0	-	0	-	0	-	-	0
Thoracics	8	-	2	-	5.6	-	1	4
Lumbars	6	-	1	-	3.3	-	1	6
Ribs	46	4	-	6	13.9	-	2	4.6
Scapula	0	0	-	0	0	-	-	0
Manubrium	0	-	0	-	0	-	-	0
Sternum	0	-	0	-	0	-	-	0
Humerus	2	0	-	1	16.7	-	1	2
Radius	3	1	-	1	33.3	-	1	1.5
Ulna	0	0	-	0	0	-	-	0
Carpals	7	7	-	0	14.6	-	1	1
Metacarpals	11	5	-	2	23.3	-	1	1.6
Manual phalanges	10	0	9	0	10.7	-	1	1.1
Pelvis	3	0	1	0	16.7	-	1	3
Sacrum	0	-	0	-	0	-	-	0
Coccyx	0	-	0	-	0	-	-	0
Femur	0	0	-	0	0	-	-	0
Patella	0	0	-	0	0	-	-	0
Tibia	0	0	-	0	0	-	-	0
Fibula	0	0	-	0	0	-	-	0
Calcaneus	0	0	-	0	0	-	-	0
Talus	0	0	-	0	0	-	-	0
Tarsals	0	0	-	0	0	-	-	0
Metatarsals	0	0	-	0	0	-	-	0
Pedal phalanges	0	-	0	-	0	-	-	0

Table 59: MNE, MNI, BRI and FI for (743) in the Central bone pit.

3.4.14 Southwest niche: (595)

Element	Count	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	234	-	6	-	30	5	1	39
Mandible	17	5	2	2	22.5	3	2	1.9
Hyoid	2	-	1	-	5	5	4	2
Clavicle	27	3	2	9	35	6	4	1.9
Cervicals	98	-	45	-	32.1	5	6	2.2
Thoracics	98	-	29	-	12.1	4	1	3.4
Lumbars	41	-	16	-	16	3	2	2.6
Ribs	493	27	5	28	12.5	5	1	8.2
Scapula	29	2	-	5	17.5	2	4	4.1
Manubrium	2	-	2	-	10	2	-	1
Sternum	4	-	2	-	10	2	-	2
Humerus	20	3	-	3	15	2	1	3.3
Radius	18	4	1	4	22.5	2	2	2
Ulna	28	5	-	4	22.5	3	2	3.1
Carpals	50	23	5	20	15	1	7	1
Metacarpals	87	21	32	24	38.5	3	8	1.1
Manual phalanges	137	-	133	-	23.8	3	5	1
Pelvis	22	5	2	3	25	5	1	2.2
Sacrum	13	-	5	-	25	3	1	2.6
Coccyx	3	-	1	-	5	-	1	3
Femur	38	4	3	6	32.5	4	4	2.9
Patella	4	1	-	1	5	-	1	2
Tibia	15	1	2	3	15	5	-	2.5
Fibula	40	3	3	2	20	4	1	5
Calcaneus	18	3	1	3	17.5	1	2	2.6
Talus	7	1	1	3	12.5	1	2	1.4
Tarsals	31	14	1	15	15	1	5	1
Metatarsals	93	25	35	20	40	3	7	1.2
Pedal phalanges	92	-	91	-	16.3	3	5	1

Table 60: MNE, MNI, BRI and FI for (595) in the Southwest niche.

3.4.15 Southwest niche: (656)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	2	-	1	-	16.7	1	-	2
Mandible	0	-	0	-	0	-	-	0
Hyoid	0	-	0	-	0	-	-	0
Clavicle	2	0	1	1	16.7	1	1	1
Cervicals	1	-	1	-	2.4	-	1	1
Thoracics	1	-	1	-	1.4	1	-	1
Lumbars	4	-	2	-	6.7	-	1	2
Ribs	42	1	1	2	2.8	1	1	10.5
Scapula	17	2	-	1	25	-	2	5.7
Manubrium	0	-	0	-	0	-	-	0
Sternum	0	-	0	-	0	-	-	0
Humerus	5	2	-	1	25	1	1	1.7
Radius	2	0	-	1	8.3	-	1	2
Ulna	8	0	-	1	8.3	-	1	8
Carpals	0	0	-	0	0	-	-	0
Metacarpals	1	0	1	0	1.7	-	1	1
Manual phalanges	7	-	7	-	4.2	1	1	1
Pelvis	1	0	1	0	8.3	-	1	1
Sacrum	0	-	0	-	0	-	-	0
Coccyx	0	-	0	-	0	-	-	0
Femur	18	2	-	4	50	2	2	3
Patella	0	0	-	0	0	-	-	0
Tibia	19	1	1	1	25	-	3	6.3
Fibula	10	1	0	2	25	1	2	3.3
Calcaneus	0	0	-	0	0	-	-	0
Talus	1	1	-	0	8.3	-	1	1
Tarsals	0	0	-	0	0	-	-	0
Metatarsals	2	1	1	0	1.2	-	1	1
Pedal phalanges	0	-	0	-	0	-	-	0

Table 61: MNE, MNI, BRI and FI for (656) in the Southwest niche.

3.4.16 Southwest niche: (734)

Element	NISP	MNE Left	MNE Axial/unsided	MNE Right	BRI	MNI nonadult	MNI adult	FI
Cranium	3	-	1	-	33.3	1	-	3
Mandible	1	-	1	-	33.3	1	-	1
Hyoid	0	-	0	-	0	-	-	0
Clavicle	0	0	-	0	0	-	-	0
Cervicals	0	-	0	-	0	-	-	0
Thoracics	2	-	2	-	5.6	1	1	1
Lumbars	5	-	2	-	13.3	2	-	2.5
Ribs	5	1	-	1	2.8	1	1	2.5
Scapula	0	0	-	0	0	-	-	0
Manubrium	0	-	0	-	0	-	-	0
Sternum	0	-	0	-	0	-	-	0
Humerus	0	0	-	0	0	-	-	0
Radius	2	0	1	0	16.7	1	-	2
Ulna	1	1	-	0	16.7	-	1	1
Carpals	0	0	-	0	0	-	-	0
Metacarpals	3	1	1	0	6.7	-	1	1.5
Manual phalanges	2	-	2	-	2.4	-	1	1
Pelvis	0	0	-	0	0	-	-	0
Sacrum	0	-	0	-	0	-	-	0
Coccyx	0	-	0	-	0	-	-	0
Femur	10	0	1	0	16.7	-	1	10
Patella	0	0	-	0	0	-	-	0
Tibia	0	0	-	0	0	-	-	0
Fibula	0	0	-	0	0	-	-	0
Calcaneus	0	0	-	0	0	-	-	0
Talus	1	1	-	0	16.7	-	1	1
Tarsals	0	0	-	0	0	-	-	0
Metatarsals	4	2	1	0	10	1	1	1.3
Pedal phalanges	1	-	1	-	1.2	-	1	1

Table 62: MNE, MNI, BRI and FI for (734) in the Southwest niche.

Appendix 4: Overall results

4.1 Overall results for both sites combined

		Site No	Side	Anatomical Preservation Index	Qualitative Bone Index	Beetle Modification
N	Valid	33816	33816	33816	33816	33816
	Missing	0	0	0	0	0
Minimum		1	0	0	0	0
Maximum		2	3	5	5	1

Table 63: Descriptive statistics for API, QBI and beetle modification across both sites.

		Angle	Outline	Texture	Abrasion	Weathering	Burning
N	Valid	4489	4491	4489	33815	33815	33816
	Missing	29327	29325	29327	1	1	0
Minimum		0	0	0	0	0	0
Maximum		2	3	3	5	5	1

Table 64: Descriptive statistics for fragmentation morphology, abrasion/erosion, weathering and burning across both sites.

Side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	21016	62.1	62.1	62.1
	1	5155	15.2	15.2	77.4
	2	5250	15.5	15.5	92.9
	3	2395	7.1	7.1	100.0
	Total	33816	100.0	100.0	

Table 65: Descriptive statistics for element side across both sites.

4.1.1 Element completeness, preservation and size

Anatomical Preservation Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0%	14	.0	.0	.0
	1-24%	23401	69.2	69.2	69.2
	25-49%	2394	7.1	7.1	76.3
	50-74%	1440	4.3	4.3	80.6
	75-99%	3382	10.0	10.0	90.6
	100%	3185	9.4	9.4	100.0
	Total	33816	100.0	100.0	

Table 66: Descriptive statistics for element completeness (API) across both sites.

Qualitative Bone Index

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0%	6529	19.3	19.3	19.3
	1-24%	5296	15.7	15.7	35.0
	25-49%	5967	17.6	17.6	52.6
	50-74%	7591	22.4	22.4	75.1
	75-99%	7644	22.6	22.6	97.7
	100%	789	2.3	2.3	100.0
	Total	33816	100.0	100.0	

Table 67: Descriptive statistics for element preservation (QBI) across both sites.

Fragment size

	N	Minimum	Maximum	Mean	Std. Deviation
Size	32842	1	39	3.37	2.560
Missing	974				
Valid N (listwise)	32842				

Table 68: Descriptive statistics for fragment size across both sites.

4.1.2 Fragmentation morphology

Angle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	6	.0	.1	.1
	Mixed	47	.1	1.0	1.2
	Dry	4436	13.1	98.8	100.0
	Total	4489	13.3	100.0	
Missing	System	29327	86.7		
Total		33816	100.0		

Table 69: Descriptive statistics for fragmentation angle across both sites.

Outline

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	7	.0	.2	.2
	Mixed	62	.2	1.4	1.5
	Dry	4421	13.1	98.4	100.0
	3	1	.0	.0	100.0
	Total	4491	13.3	100.0	
Missing	System	29325	86.7		
Total		33816	100.0		

Table 70: Descriptive statistics for fragmentation outline across both sites.

Texture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fresh	3	.0	.1	.1
	Mixed	19	.1	.4	.5
	Dry	4465	13.2	99.5	100.0
	3	2	.0	.0	100.0
	Total	4489	13.3	100.0	
Missing	System	29327	86.7		
Total		33816	100.0		

Table 71: Descriptive statistics for fragmentation texture across both sites.

4.1.3 Weathering

Weathering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	31421	92.9	92.9	92.9
	Cracking	1003	3.0	3.0	95.9
	Flaking	1062	3.1	3.1	99.0
	Extensive flaking	241	.7	.7	99.7
	Fibrous texture	50	.1	.1	99.9
	Splintered	38	.1	.1	100.0
	Total	33815	100.0	100.0	
Missing	System	1	.0		
Total		33816	100.0		

Table 72: Descriptive statistics for weathering across both sites.

4.1.4 Abrasion/erosion

Abrasion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	29335	86.7	86.8	86.8
	Slight	2818	8.3	8.3	95.1
	Moderate	923	2.7	2.7	97.8
	Mostly abraded	484	1.4	1.4	99.2
	Completely abraded	231	.7	.7	99.9
	Heavy abrasion	24	.1	.1	100.0
	Total	33815	100.0	100.0	
Missing	System	1	.0		
Total		33816	100.0		

Table 73: Descriptive statistics for abrasion and erosion across both sites.

4.1.5 Burning

Burning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	33756	99.8	99.8	99.8
	Present	60	.2	.2	100.0
	Total	33816	100.0	100.0	

Table 74: Descriptive statistics for burning across both sites.

4.1.6 Animal damage

Beetle Modification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	33766	99.9	99.9	99.9
	Present	50	.1	.1	100.0
	Total	33816	100.0	100.0	

Table 75: Descriptive statistics for beetle modification across both sites.

Rodent Gnawing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Present	14	.0	100.0	100.0
Missing	System	33802	100.0		
Total		33816	100.0		

Table 76: Descriptive statistics for rodent gnawing across both sites.

4.2 Cluster analysis

4.2.1 Cluster analysis of comparative site data

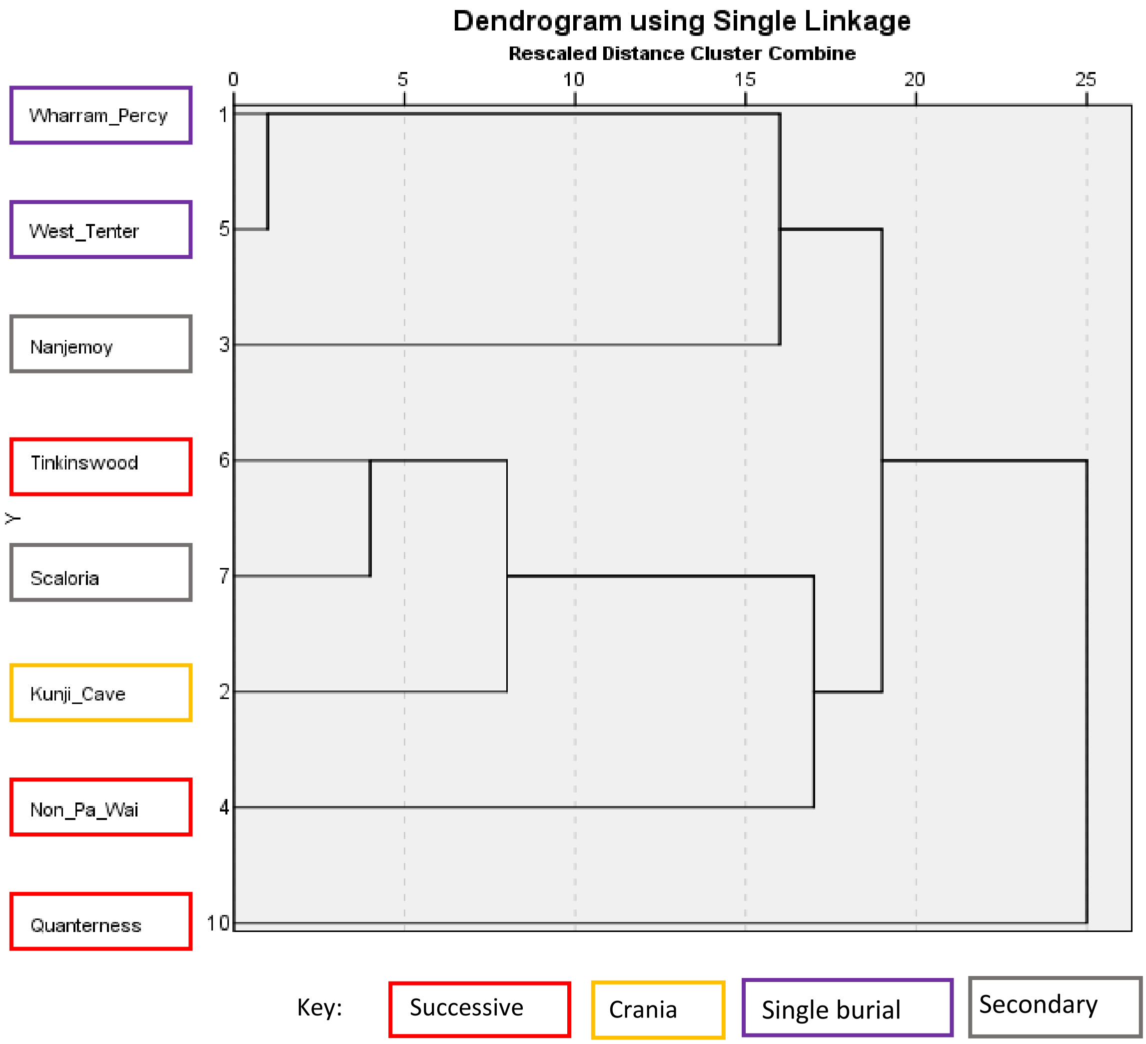

Figure 45: Comparative sites analysed using single linkage cluster analysis.

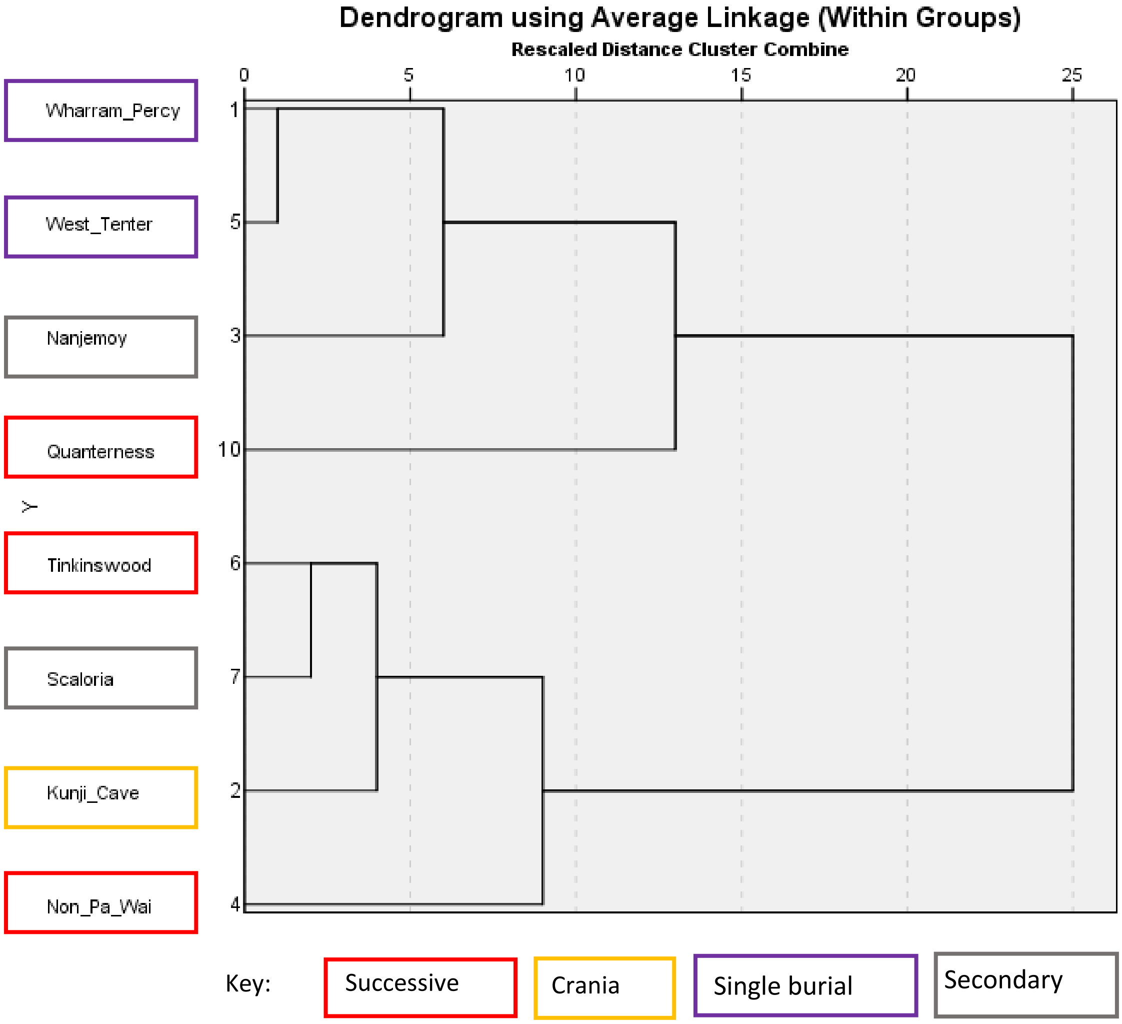

Figure 46: Comparative sites analysed using average linkage within groups clustering.

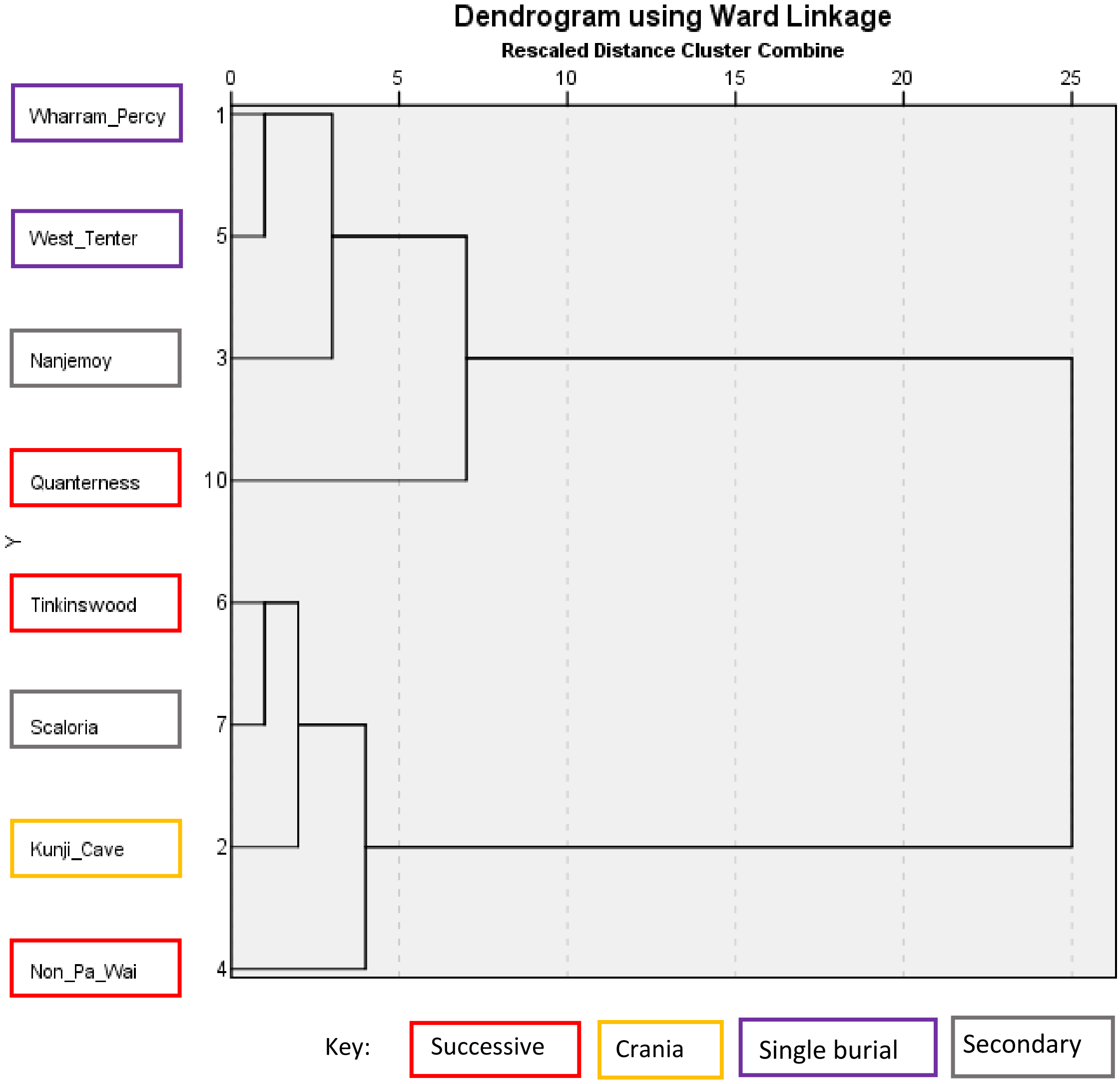

Figure 47: Comparative sites analysed using Ward's method of clustering.

4.2.2 Cluster analysis of Maltese data

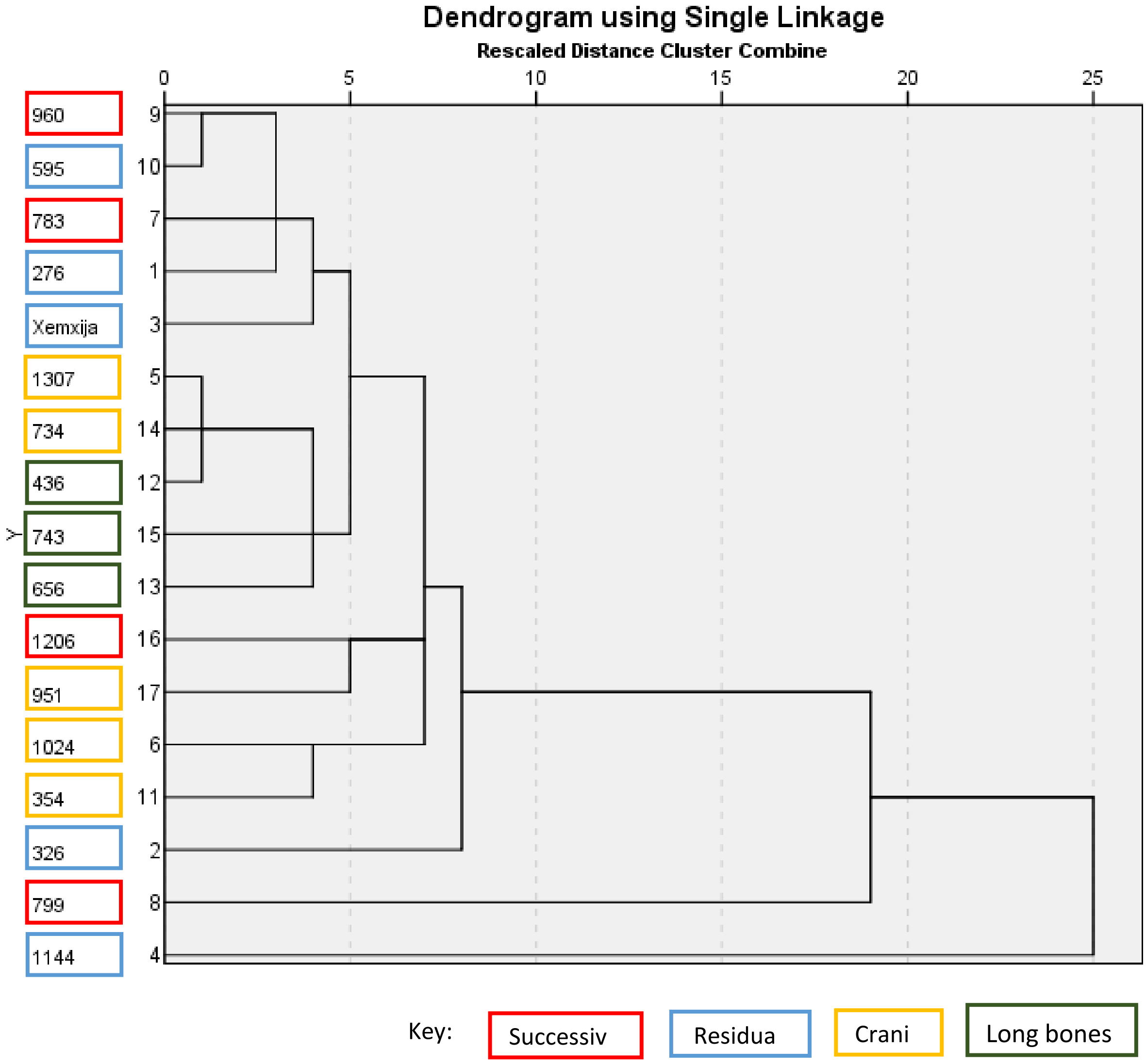

Figure 48: All contexts analysed using single linkage cluster analysis.

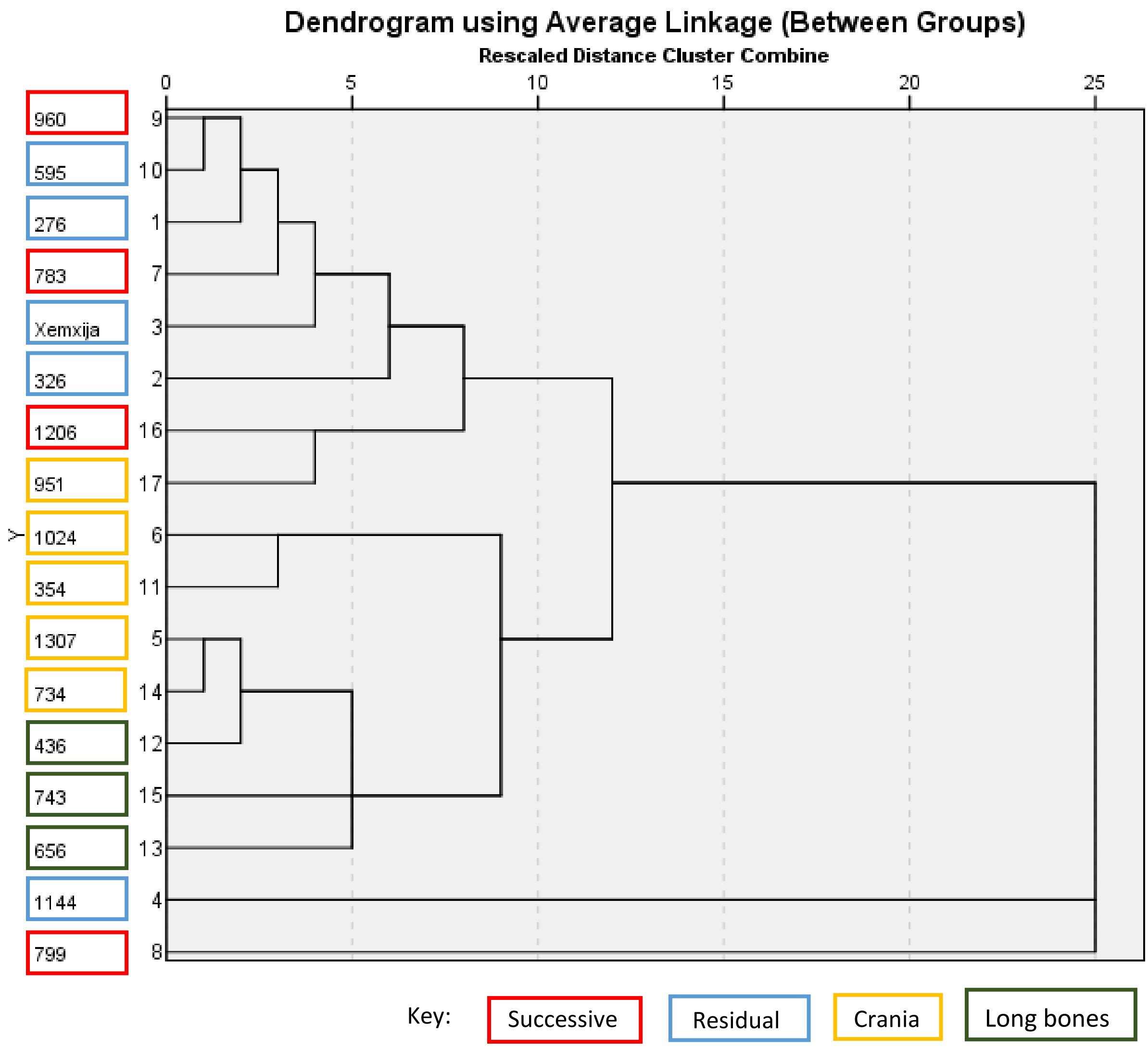

Figure 49: All contexts analysed using between groups average linkage cluster analysis.

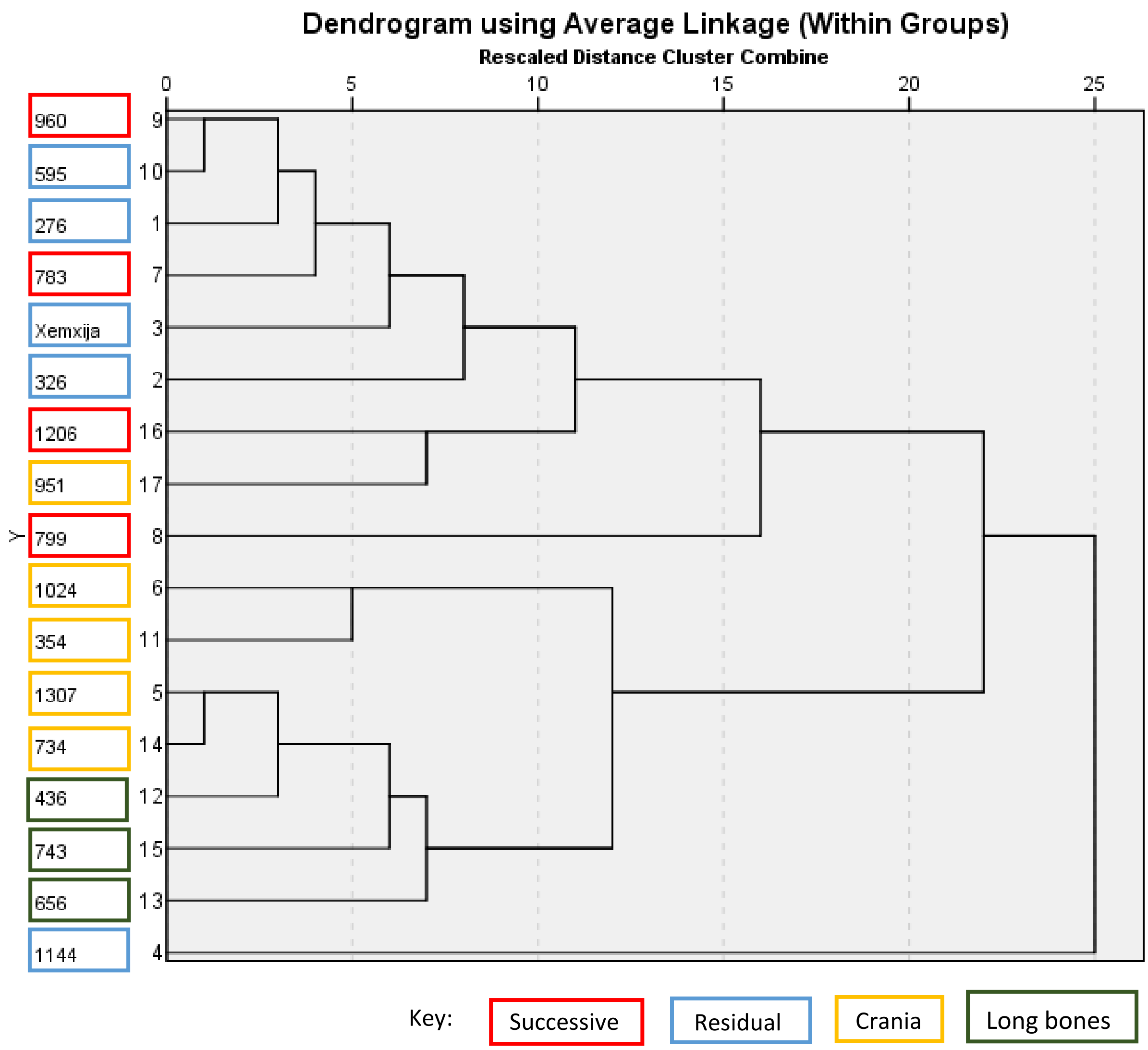

Figure 50: All contexts analysed using within groups average cluster analysis.

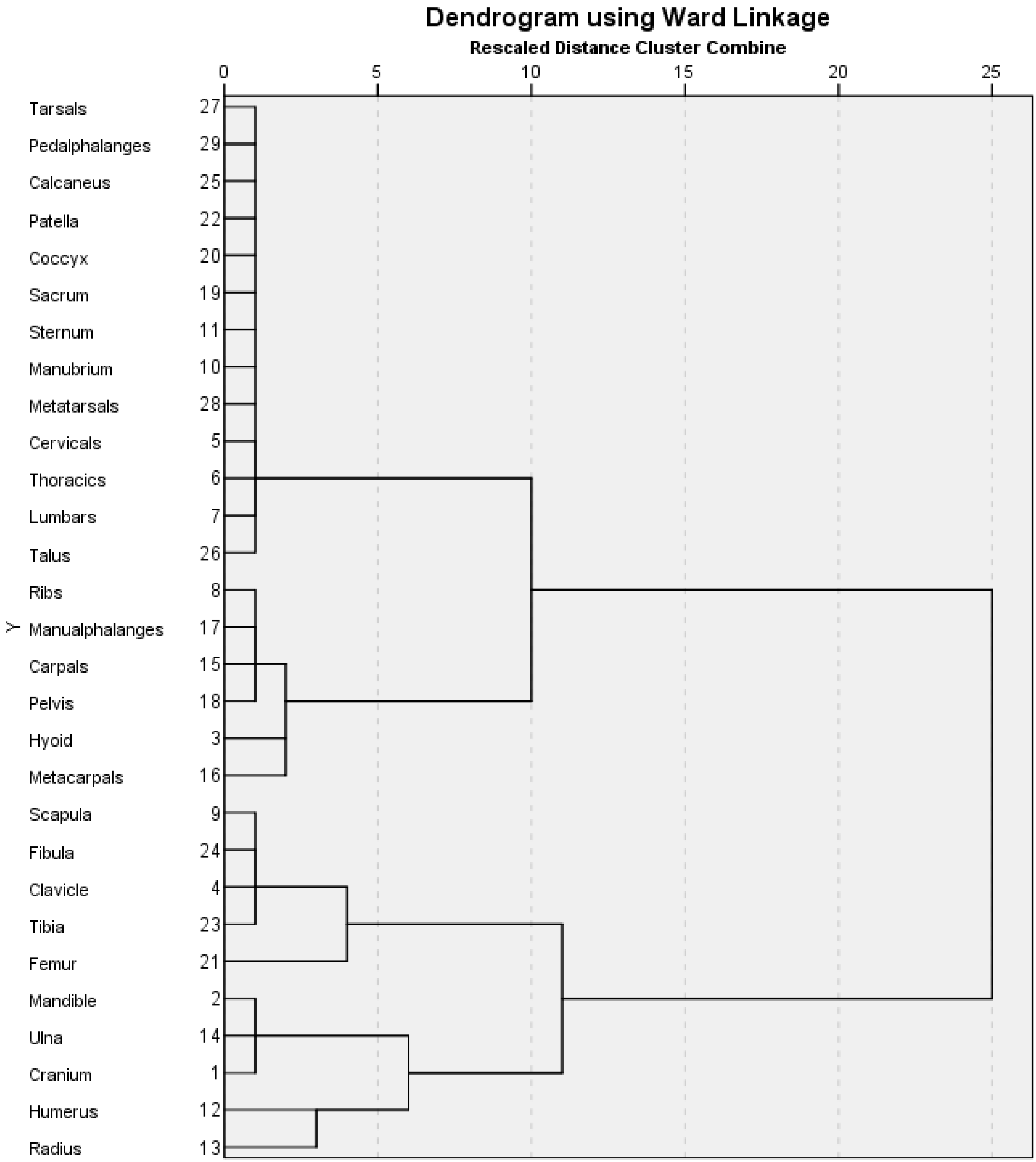

Figure 51: All contexts with an over-representation of long bones analysed using Ward's method.

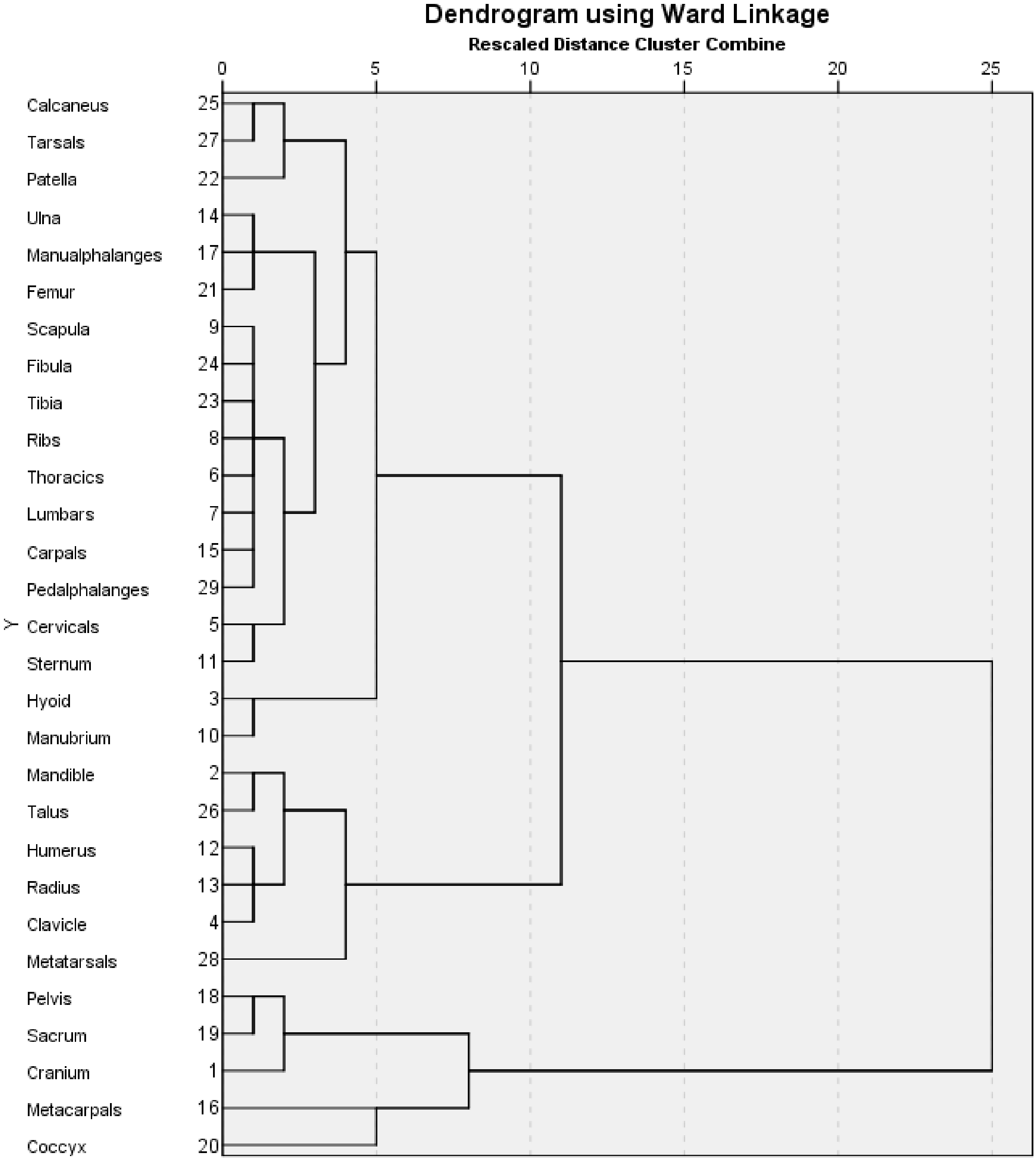

Figure 52: All contexts with an over-representation of small bones (residual signature) analysed using Ward's method of clustering.

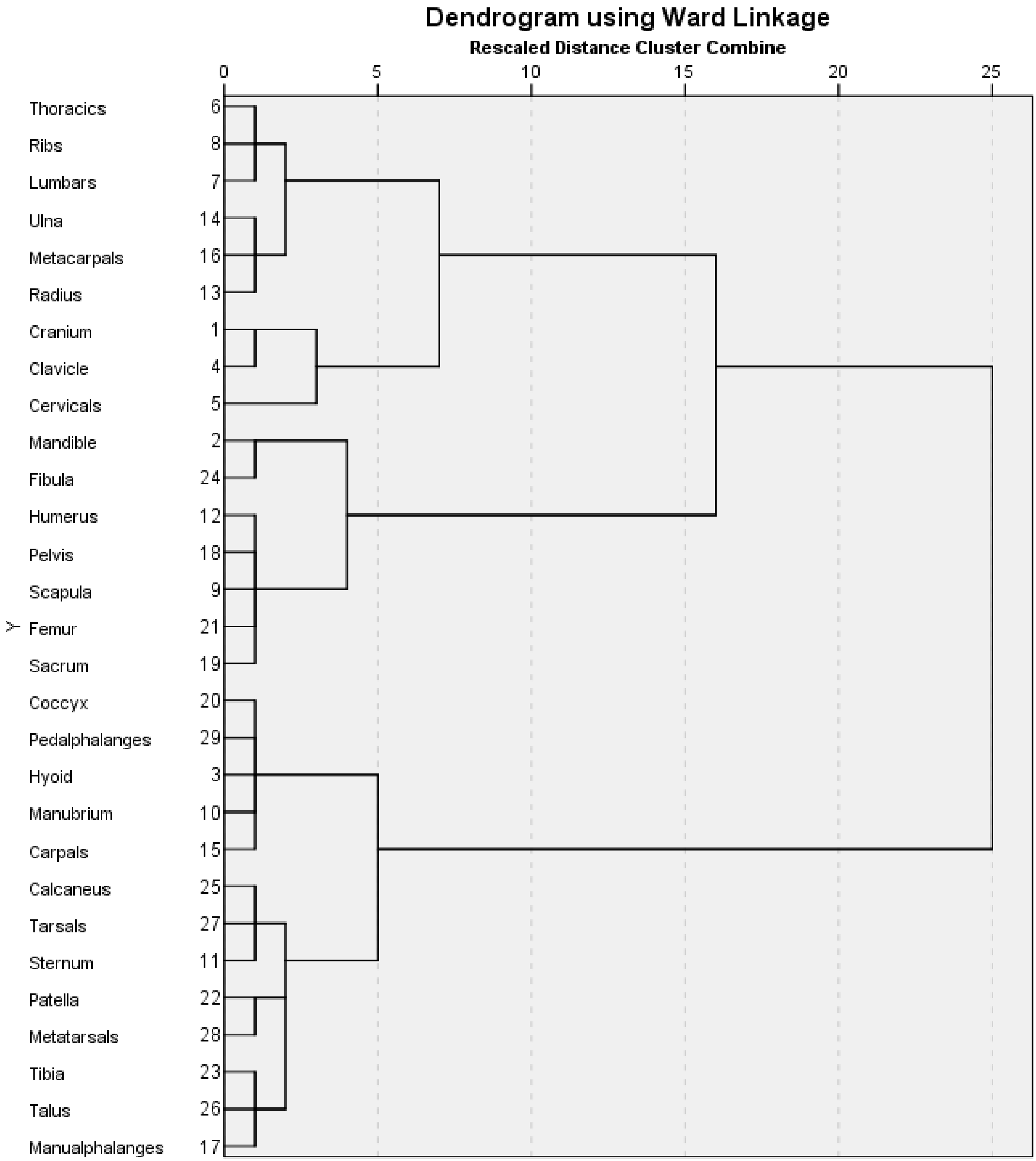

Figure 53: All contexts primarily representing signature of successive deposition analysed using Ward's method of clustering.